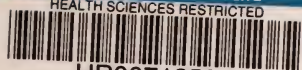


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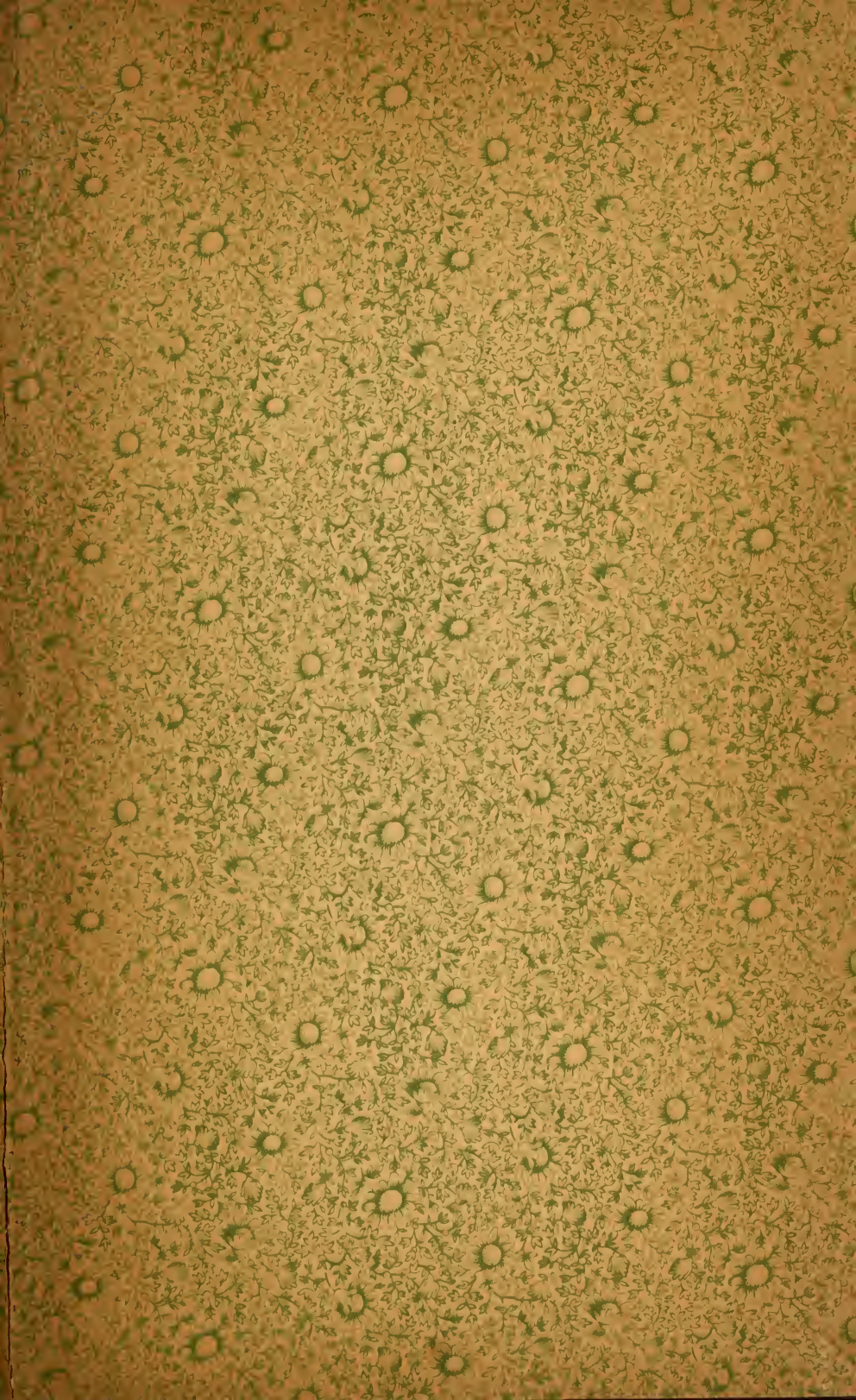
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# THE JOURNAL

OF

## THE ALLIED SOCIETIES

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# THE JOURNAL

OF

## THE ALLIED SOCIETIES

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### PROFESSIONAL OPPORTUNITIES.

To the writer there seems to have been no time in the history of the dental profession, when the opportunities presenting to the *qualified* dentist for doing service to humanity and for advancing the status of his profession have been so numerous or so broad in their scope as they are at the present moment. We now look forward confidently to a change in the attitude of such medically educated men in our own ranks, as have regarded the scope of dental work to be limited to the repair of local defects and lesions, and from whom scornful reference to their own work has not been unknown, coupled with expression of desire for a wider field in which they might practice preventive medicine. To these men the medical profession has naturally turned for information as to the scope and possibilities of dentistry. The belief of many dental practitioners, that there is no portion of the human organism where more important opportunities for preventive medicine present, than in that portion under the direct care of the dentist, has been spreading until it is doubtful if the above expression of it will be combatted by any considerable portion of the physicians and others, who are in close touch with the results of dental clinic work in public and charity schools, and in hospitals, where constructive dental work is well established.

The same view is notably gaining ground in the medical profession at large, and, while it leads to the expression of some most startling conclusions in the enthusiasm which it arouses in the minds of new converts, even their extravagance may be of value in focusing the attention of more medical men upon the possibilities of the mouth. This awakening of the practitioners of general medicine, and of those who specialize in various portions of the digestive apparatus, to the fact that their patients have mouths, and that the possession of teeth and their effective use is essential to the prevention and control of most, if not all, disorders dependent upon malnutrition for their inception, is shortly to result in a demand for efficient dentistry, such as the world has not yet known.

Following this awakening to the possibilities of efficiency in the initial act of digestion and of the value of a wholesome vestibule to the digestive tract, must come general public knowledge of the blight that falls on so many growing children, due to the deformity and distortion of that portion of the head containing the nerves of special sense and their ganglia, including even the floor of the brain case, as well as the nasal passages and their sinuses.

The organizations for fighting tuberculosis will eventually demand of us effective means for preventing this cramping of air passages, and they will demand it in no uncertain tones when the full realization of the value of an efficient normal breathing apparatus is brought home to them.

Are we as a profession ready to meet these demands that the next decade is surely to bring to our doors; are we ready to reap the harvest of appreciation and gratitude which will follow our effective handling of the mass of work, and the new problems these demands will bring us? It is for this, that generations of our predecessors have struggled to make us a profession, and to inculcate in us professional ideals. Are we seeing to it that our dental schools are turning out men fitted by education and



training to cope with these problems, and capable of grasping the fact that to work *worthily* is to be set before every professional student as the duty that comes first to each professional man—that “in work done solely for the fee lies the danger”? Are we seeing to it that our young men are being taught that the moment a professional man accepts the responsibility of advising or working for a patient, that patient’s interests become paramount—that in every act he must set the patient’s highest interest before his own?

Note that the word “we” is used concerning our colleges—are not we, as alumni, all responsible for what they are doing? Are we not bound to exert our influence to see that they are doing the profession’s and the world’s work well? Have we a right to draw aside and say they (the faculties) are not doing their work as they should? Every college graduate in the dental profession owes it to his predecessors who made a professional education possible for him, and to posterity which will look to us for its birthright, to do at least once every year of his professional life (many times, if possible) something that will help along the work of his Alma Mater.

If your college is wrong, have the courage of your convictions and help set it right, but help!

It will be only by presenting a united front, shoulder to shoulder, that we shall find courage to tackle the problems that are coming to us. It will take courage to acknowledge that we have too long been ourselves, looking at mouths, only to see whether a filling or a crown or some other detail was needed, and that, too rarely, have we considered the mouth of a patient as a complete organ, the efficiency of which rested not only upon our ability to perform with skill, the individual operations called for, but still more upon our ability to so plan and harmonize those operations that normal function should be augmented, and extended, and never reduced.

It will take courage to decline every case that does not in-

volve working in harmony with a plan looking to full grinding efficiency, and as near an approach as possible to normal integrity of tissue in the *whole* organ. Many of us may never reach that goal, but our coming generation must, and we must see that they are equipped for it or our profession will miss its full fruition.

It will take courage to root out from our ranks the undesirable, who from sheer laziness are perpetuating the fallacy that pyorrhea is incurable, and from laziness of greed slop-in plastic fillings in half prepared cavities, leaving projecting margins to cause disease of surrounding parts, and from laziness *and* greed are filling their patients' mouths with gold inlays and crowns that are equally provocative of disease from the same causes, and which have no hint of normal contact with adjoining teeth.

It will take courage because, alas!—too many of these blots are found among our influential and financially successful practitioners. These men jeopardize our progress because they must fail completely, when called upon to demonstrate the value of a wholesome efficient masticating organ upon the subject's general health, unless aroused to their responsibility with no gentle hand.

The means for doing this is not apparent.

May we look hopefully to the "Unification of the Dental Profession" and the propaganda of systematized post graduate work which is growing up so vigorously in the middle west, and even reaching us here in our disorganized state, for the remedy for these conditions.

Independent journalism is established, societies have developed and grown strong, advocating and supporting it, other societies have atrophied meantime for lack of an object to work for.

In turn, independent journalism will flourish like the proverbial bay tree, if given a definite object to work for that is



dominant enough to command support and to arouse discussion.

Nineteen fifteen movements are becoming popular, why not an organized movement for strengthening our educational work both under graduate and post graduate (especially the latter), that we may be ready for our greater opportunities as they arrive?

HENRY W. GILLET.

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## ON A CHAIR OF DENTAL SCIENCE IN THE MEDICAL SCHOOL.

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BY JOHN OPIE MCCALL, D. D. S., BINGHAMTON, N. Y.

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The title of this paper expresses, probably with sufficient clearness, the conviction of your essayist that a chair of dental science and oral hygiene should be established in every medical school, and at once raises the question as to why it should be established and what it should aim to teach. At the outset we are confronted with that subject of much discussion, the relation of the medical and dental professions to each other. And while the writer cannot pretend to settle this beyond dispute, he must at least arrive at some definite conclusion on which he may base his arguments relative to the subject proper of this paper. Your essayist takes the stand that dentistry is a branch of the healing art which we call medicine, in other words, a specialty of medicine; that the dental surgeon is no less a practitioner of medicine than the oculist and aurist, that in fact he is more a practitioner of medicine than the followers of any other one specialty, judging by the effects of his work on the health of the body as a whole. This assertion, of course, raises the question as to the education of the dental surgeon himself, a question which, however, cannot be taken up in this paper. Let us see briefly what reasons we can adduce to support our contention that dentistry is a specialty and the most important single specialty of medicine and not a profession by itself. The fact that the dental and medical professions receive their education in separate institutions can hardly be urged as an argument that the professions themselves are separate and

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\* Read before The New York Institute of Stomatology, October 5, 1909.

distinct, for it touches only the most superficial aspect of the matter and even at its face value is not conclusive. The essential points are that the dental surgeon is called upon to treat deviations from the norman in the teeth and mouth; that these deviations, which are largely the result of disease processes, involve etiological and pathological factors analogous in their essentials to those with which the physician has to deal; that the effects of these deviations from the normal are by no means confined to the mouth and adjacent structures, but that through their influence on the nervous system and the alimentary canal, these effects may extend throughout the entire system to a degree hardly approached in the field of any other specialty. That this view has not been more generally held by the medical and even the dental professions is due to the distortion of perspective by the great attention to mechanical procedure necessary in the treatment of dental disorders. The dentist and especially the self-styled "practical man" has not generally given himself credit for possessing scientific knowledge nor for applying that knowledge in his treatment of the disease conditions found in the mouth. Yet it is a fact which only needs to be stated, to be accepted, that the "practical man" if he be successful in caring for the mouths of his patients must possess a well developed diagnostic ability, a very fair knowledge of the etiology and pathology of dental maladies, and a decided ability to choose the right remedy for the conditions at hand whether it be the selection of gold foil for a carious cavity or an antiseptic dressing for a putrescent root canal. His method of arriving at this knowledge may have been empirical but his empirical conclusions must tally with correct scientific findings or his operations will inevitably fail to give the required service. The fact that the carrying out of remedial measures in the mouth involves mechanical ability and manual dexterity of such a high order and the expenditure of his entire working time in procedures of a mechanical nature has blinded the dentist to the scientific and medical nature of his operations. As stated before, it is largely a matter of faulty perspective. In order to put this matter in its proper light, let us briefly review the more common dental maladies, their etiology, pathology, and possible sequelæ. Dental caries has an etiology involving bacterial action, both direct and indirect on vital tissues resulting in a progressive loss of tooth substance and is thus established as a true disease process. Its

systemic effects are both direct and indirect effects on the nervous system and indirect on the alimentary tract through impairment of mastication and the ingestion of various decomposition products. Pulpitis is most frequently of bacterial origin but always exhibits the characteristics of a true inflammation and may affect the general circulation and temperature and in addition may profoundly affect the nervous system. Apical pericementitis is practically always of bacterial origin, often affects the general circulation and temperature and like pulpitis usually causes intense pain which in itself inhibits secretions throughout the body and affects the general mental and physical efficiency. In the chronic form of pericementitis characterized by the establishment of a fistulous opening we have a discharge of pus which must have a deleterious effect when taken into the alimentary canal. The various malocclusions of the teeth are largely of developmental origin and affect the general economy through their influence on mastication and the size of the nasal passages. The etiology of the destructive processes usually grouped under the name "pyorrhea alveolaris" is still a subject for controversy, but the great majority of cases show a bacterial involvement with a resulting constant formation and throwing off of pus from the investing tissues of the teeth. The result of pyorrhea then is two-fold,—an impairment of mastication through tenderness, looseness and exfoliation of the teeth; and the ingestion of quantities of pus, the effects of which on the general system are a derangement of digestion, assimilation and metabolism, a lowering in tone of the alimentary mucous membrane, and auto-intoxication. The direct effect on the nervous system is comparatively slight.

It will thus be seen that the dental surgeon is at all times concerned with disease processes in vital tissues, with checking the spread of these processes and replacing by what means he can the tissues destroyed during their progress. Essentially then he is a medical specialist even without taking into consideration the prevention and amelioration of systemic disorders which he accomplishes. While the evidence here brought forward has not been fully detailed, your essayist feels justified in drawing from it the conclusion that dentistry is a specialty of medicine and a highly important one. Now we may exonerate the physician and to a certain extent the dentist for failing to recognize dental work as being special medical work because of the great amount of neces-



sary mechanical work before referred to. However, we cannot so readily excuse the medical profession for its inattention to the influence of dental disorders on the general systemic condition, inasmuch as it assumes jurisdiction over the health of the whole body and thereby obligates itself to acquire a knowledge of all the conditions which may affect the bodily health. Therefore, if we can show that disorders occurring within the mouth may affect other parts of the body and also show that the knowledge of medical profession in regard to these disorders and their possible sequelæ is either limited or actually defective then we shall have demonstrated conclusively the need of instruction in dental science as part of the curriculum of the medical school.

Let us then consider some of the disorders occurring within and adjacent to the mouth which may affect body conditions together with the knowledge concerning them possessed by our medical brethren as indicated by their practice. This may perhaps be best accomplished by first giving general consideration to the mouth and its relation to the body. The mouth with its extensions, the pharynx and larynx is the gateway through which not only food and air reach the interior of the body, but also very many of the toxic influences whose manifestations the physician is called upon to combat. Both of these facts are of tremendous significance. On the one hand is placed on the mouth and its contained organs the duty of digesting a part of the food taken in and of properly preparing the remainder of it for further digestion and assimilation; and on the other hand is laid on it the responsibility for harboring and permitting the ingress of pathogenic bacteria and other deleterious matters. It is obvious that anything such as malocclusion, caries or periodontal tenderness which will interfere with proper mastication and insalivation of food, will derange to a greater or less extent gastric and intestinal digestion and thus affect assimilation, metabolism, and elimination. Less obvious, but even more important are the systemic effects of the ingestion of bacteria, products of decomposition of food lodged in cavities of decay and around unclean teeth and still more the ingestion of pus from teeth affected with chronic abscesses and pyorrhea alveolaris. In other words unless a mouth is kept in a state of the highest cleanliness and health and unless the food is properly insalivated and sufficiently subdivided to allow ready access of gastric juice to every particle, we shall have decomposition products and

germs swallowed at every meal, varying in amount and virulence according to conditions, and imperfectly destroyed if at all by the acid of the gastric juice. What good can be expected from the prescription of medicine, diet and thorough mastication of food when the more thoroughly the food is masticated the more thoroughly is it mixed with virulent poisons constantly poured into the mouth. We may consider separately the effects of faulty mastication and ingestion of toxins although clinically these conditions are nearly always associated. The derangement of gastric and intestinal digestion due to incomplete mastication is caused by the difficulty of digesting the food and the extra work that must be done both in digesting it and passing along the undigested residue, the result being physical discomfort, and especially the strain on the system and impairment of efficiency recently brought into prominence through the writings of Chittenden, Fletcher, Fisher and others. The effect of the ingestion of toxins is not only to vitiate the digestive fluids and cause auto-intoxication through their absorption into the circulation, but it needs only slight consideration to make it plain that the effect of a constant swallowing of pus and decomposing food must be to lower the tone of the alimentary mucous membrane, derange its secretions and immensely increase the subject's liability to contract gastro-intestinal diseases. The latter point is of sufficient importance to merit more extended comment. It is a well-known fact that pathogenic bacteria can only obtain a foot-hold on tissue that is physically below par. It is quite conceivable then that a person having a normal mouth kept clean and properly used, should have an alimentary canal in such a high state of health as to successfully resist the invasion of even typhoid germs. In other words it is the belief of the writer that a person having a mild case of pyorrhea will fall a ready victim to gastro intestinal diseases to which the person having a healthy, clean mouth will be almost entirely immune. Taking these facts into consideration, it can scarcely be denied that in the treatment of disorders having their inception in the alimentary canal, the condition of the mouth is a factor which should receive the most careful consideration and in fact cases can be cited in which proper dental treatment alone has cured indigestion and caused marked improvement in the general physical condition. This point cannot be emphasized too strongly as the following case in the writer's practice will show.

Mrs. D., age 38, presented with a case of pyorrhea of several years standing. There had been but little destruction of tissue, but the gum margins were somewhat inflamed and a little pus could be expressed along the lingual margins of the molars, upper and lower. The point to be brought out was that the case was a mild one, evidences of inflammation were slight and only the most painstaking examination revealed the fact that pus was being formed in the mouth. In other words to one not specially trained in dental examination, the mouth would have appeared clean and healthy. Treatment was given for the pyorrhea and a year after its completion the patient volunteered the information that the treatment had cured her of a case of chronic indigestion of several years standing. She had received no other treatment and had made no change in her manner of living in that time. Stress is laid on this case because of the mild type of the inflammation which would undoubtedly have been overlooked by a diagnostician without dental training. However, the case is typical of many to be found in the practices of specialists in oral prophylaxis, in that the deranged condition of the alimentary canal was evidently caused solely by the pyorrhea. It also gives special weight to the contention of your essayist that mouth conditions have a marked influence over a patient's susceptibility to infectious diseases especially gastro intestinal diseases. If however the medical profession takes oral conditions into account in treating troubles in the alimentary canal and beyond the fact is very seldom brought to the attention of the dentist either by physician or patient and the cases which have come under the personal observation of the writer have not indicated a knowledge of normal and abnormal mouth conditions on the part of the physician commensurate with their true importance. If, then, mouth conditions may be causative factors of considerable importance in systematic disturbances what shall we say of the probable effect of the care or neglect of the mouth during the course of diseases initiated through other channels? In other words what care should be given the mouth during sickness and convalescence and what attention does it actually receive from the physician? In view of the relation of the mouth to the general system it hardly need be stated that the mouth should at all times be kept clean, and in view of possible perversion of the oral secretions should be kept alkaline. Does the physician or the nurse in home or hospital, do this? Some



effort is made in this direction, usually a swabbing out of the mouth with a piece of cotton on an orange-wood stick dipped in some aromatic solution, the chief effect of which is to administer to the self-respect of the physician and nurse and the mental comfort of the patient. An increased knowledge of the mouth and its needs would make possible the accomplishment of appreciable benefits through the checking of fermentation at the beginning of the alimentary canal, in addition to the mental effect with its reaction on appetite. This is a field for the practice of a modified oral prophylaxis. In this connection should be mentioned the method of administration of acid tonics and similar solutions, which indicates on the part of most physicians either a very faulty knowledge of the structure of the teeth or a complete disregard of these facts, the effect of which is usually a very considerable and almost entirely preventable loss of tooth substance. During pregnancy the general conditions and especially the oral secretions are such as to predispose to caries. Does the physician take cognizance of this and send the prospective mother to the dentist for a consultation which shall benefit not only her general condition but her mouth? Not in the experience of your essayist or of dentists with whom he has talked. The connection between the ingestion of earthly phosphates and the process of calcification has not been clearly traced, but it is quite certain that if these materials are not supplied to the mother either the teeth and bones of the child must suffer or they must be calcified at the expense of the mother. This suggests an attention to diet during pregnancy which it is to be feared is not often given. In early life many disorders occur in which mouth conditions may be a factor, and while on the one hand the physician may be ready and perhaps too ready to ascribe to dentition derangements which should properly be referred to improper feeding and unhygienic conditions, on the other hand many intestinal disorders may be checked by proper care of the mouth. The physician sees the child at an early age and is in a position to determine the presence of dental disorders and refer the little patient to the dentist for the correction of troubles which if allowed to go unremedied may affect the mental, moral and physical development of the child to an astonishing degree. Mouth-breathing is properly to be included among the disorders which the physician should notice since it not only produces dental irregularity but adversely affects the metal and phys-

ical development of the child. The responsibility is squarely on the physician whose care of the whole body makes necessary the acquisition of a proper knowledge of the mouth as a part of the body, especially at a time when oral conditions may affect the entire life of the individual. The prescription of food requiring thorough mastication of the food may be mentioned here as a prophylactic measure of considerable importance. We may ask then whether the practise of physicians in regard to oral conditions during childhood is such as their patients have a right to expect? If it is evidence to that effect has not come to the attention of the writer.

The possible dental origin of facial neuralgia is quite well understood by physicians but on the other hand there are records of cases of treatment of abscesses of dental origin discharging on the face and neck which have shown a lack of the required knowledge,—in these cases,—dental knowledge. The possible dental causation of antrum trouble is not always taken into account as it should be. And the usual treatment of fractures of the maxillae by general surgeons leaves much to be desired.

Little has been said as to the effect of prevailing medical practise on the teeth themselves, but the lack of precaution exhibited in the administration of acid solutions typifies in the experience of your essayist the general attitude of the medical profession to the teeth, an attitude which in the light of their bearing on the physical economy is hardly in keeping with the achievements of that profession in other lines. Mention might be made at this point of a phase of the relationship of mouth conditions to systemic conditions which is just beginning to engage the attention of members of the dental profession. It is the matter of the care of the mouth just before operations and especially before operations which involve the making of a wound in any part of the alimentary canal. It would seem to be inconsistent, to say the least, to take infinite pains to prevent infection of such a wound from the outside while at the same time allowing the same wound to be bathed on its inner surface with pus and decomposed food swallowed with saliva and food. The giving of prophylactic treatments before operations should prove to be a valuable aid to the surgeon in lessening surgical fever. Now, if it be true that oral conditions and disorders have a marked influence on systemic conditions as indicated by theoretical considerations and records

of cases ; and if it be true that the attention paid to the mouth by the practising physician and his knowledge concerning it is of the character indicated, as is borne out by the experience of practising dentists, then the foregoing recital constitutes a strong indictment of the medical profession, an indictment which can only be quashed by the establishment of a chair of dental science and oral hygiene in every medical school in the land. It may be well to state here that the writer argues for a chair of dental science in the medical school not only because of a belief that the medical student should receive instruction in this department along with other medical instruction, but because he believes that the physician in active practice will neither make the effort to read up on this subject nor be able to get the practical instruction necessary. Beyond this it is hardly necessary for your essayist to go. He has set down the facts as he believes them to exist ; their truth or falsity can be determined by investigation, and in view of their importance if true, the statements herein made should most assuredly not be dismissed without investigation.

In closing, it may be well to outline briefly the instruction in dental science which the medical student should have and also to indicate something of the position which the chair of dental science and its incumbent should occupy in the medical school. The medical student should be instructed in both the gross and microscopical anatomy of the teeth and their investing tissues. He should know their nerve and blood supply, and their anatomical relationship to adjacent structures. He should know something of malocclusion and also of dental embryology and chemical make-up. He should study the etiology, symptomatology and pathology of dental caries, pulpitis, pericementitis and pyorrhea alveolaris, as far as it has been possible to determine them, as well as the pathology of lesions occurring in the soft tissues of the mouth. And he should receive such practical instruction in oral examinations as will enable him to determine the presence of lesions in the teeth and soft tissues of the mouth, distinguish between deciduous, permanent and supernumerary teeth, and discover malocclusion. He should be able to test the vitality of teeth, determine the possible sources of neuralgic and abscess conditions in the mouth. And last, but certainly not least, he should be able to determine the presence or absence of purulent inflammations and other sources of food contamination in the mouth. Instruc-



tion should also be given in the hygiene of the mouth both in sickness and health. This instruction need not be as detailed as the same instruction in the dental school, but must, of course, be given in a way which will make clear the connection between dental disorders and systemic conditions. It is difficult to say how much time such a course should occupy, but to cover the subject adequately, a course of lectures should be given throughout at least one college year with ample hospital work in addition. It is certain, however, that the course must be admitted into the curriculum on a par with the other courses and the student must be required to take an examination both written and practical, passage of which will be necessary to secure the medical degree. The professor of dental science must be a dental surgeon of experience whose qualifications both practical and theoretical are such as will gain him recognition in the dental profession and he must be admitted to the faculty on a footing of equality with the professors of other branches. This last point is one of great importance. Our profession has had one experience in accepting a position subordinate to the medical practitioner and cannot repeat the experiment. It is not a matter of pride or professional feeling alone. Far more than that. It is a matter of giving to the mouth its proper position as a factor in general bodily disorders, and thereby insuring to the human race the treatment to which it is entitled at the hands of the physician. There can be no question of the desirability of obtaining the maximum of understanding and respect between the various practitioners of the healing art, in order that they may best serve the interests of their patients. Bearing on this point, it is a well known fact that when new ideas in regard to the healing art have been developed by some person or group of persons outside the regular ranks of the medical profession, these new ideas, or the new applications of old ideas have been lauded as having a universal application. Their followers have not been content to confine their ministrations to the disorders for whose treatment their ideas have value, but have insisted on invading the entire field of medical practice; the result of which has been to put the medical profession in a position of opposition and prevent its adoption of the elements of value in the new system. Now it is far from being the belief of your essayist that the physician should call in the dental surgeon to treat every patient who comes into his office or that dental dis-

orders play a part in the causation of *all* systemic maladies, but it is his belief that the mouth has much to do with the inception of infectious diseases, and plays a very important part in gastrointestinal troubles and their sequelæ. It is an old saying and a pregnant one that most of the ills of the flesh have their origin in the stomach. And since the stomach can only be reached by way of the mouth, the latter organ should receive an equal amount of consideration and care. And in the estimation of your essayist this consideration, as well as the desirable understanding and respect between the medical men and their dental brethren, can most quickly and completely be obtained, together with the more concrete benefits mentioned in this paper, by the establishment in medical schools of a chair of dental science.

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## THE SURGERY OF THE ROOT SURFACE IN ITS RELATION TO PYORRHEAL INFECTIONS.\*

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BY T. B. HARTZELL, D. M. D., M. D., MINNEAPOLIS, MINN.

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*Mr. President and Ladies and Gentlemen of the Metropolitan and Allied Societies—*

It is a great honor to be asked to contribute even a small part to the growing fund of knowledge regarding the subject under discussion, and I wish to express to you my appreciation of so great a compliment. In view of the fact that the time is brief, I will not spend it discussing the various theories regarding pyorrhea, but will present a few of the deductions I have made from the study of four hundred and fifty cases over whose treatment I have had direct supervision.

In these cases our first step was to remove all hopelessly loose teeth, those which had not enough alveolar process left to support them, and wherein artificial support could not profitably be afforded.

Our second step was to *skin* the root surface to just a sufficient depth to obliterate all evidence of peridental membrane fiber attachment.

This is in brief the treatment, and the practice of it has resulted in the grouping of these cases into two classes.

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\*Read before the Metropolitan and Allied Societies. October 18, 1909.

In the first class, by far the larger one, amounting to 90 per cent. of all cases treated, the pus flow ceased, the turgid cellulitis of the gum disappeared, and the pockets, created by loss of the bone, filled with healthy granulations, which later organized, became firm, connecting tissue, hugging the roots tightly. The swelling of the fibers, still intact, which united the root to the socket, rapidly receded, so that these teeth became as firm as the lessened depth of socket would permit.

Twenty-five of these cases were individuals who were suffering pulmonary tuberculosis. Three individuals were suffering from diabetes mellitus, and, upon the successful issue of the treatment, pus ingestion having ceased, sugar absolutely disappeared from the urine. Twelve were syphilitic cases of long standing. The great majority of these cases, however, were individuals in a state of average good health. Many of these cases showed no deposits in appreciable amounts, simply mild inflammations, pockets, and a thin white pus, which ceased on planing the root surface, though the great majority did show deposits in varying amounts, and yellow pus, which invariably contained several varieties of micro-organisms.

The second class, representing those cases which did not benefit greatly by the treatment, small in number, averaged 10 per cent. of the whole, and are typified in part by a recent case, that of a man fifty years of age, by occupation a banker, who showed no improvement under treatment, in fact grew worse, an examination of whose urine revealed the fact that the bulk of urine in twenty-four hours was 28 to 35 ounces with a specific gravity of 1030, and that it contained 12 to 20 grains of uric acid in twenty-four hours instead of 6 to 12, the normal variation.

This group also contained all those failures due to faulty operative procedure, also those teeth which contained unrecognized dead pulps. By faulty operative procedure I mean that areas of root surface had been left undisturbed, or that the cutting was too deep, opening up the cellular structure of the cementum so that the protoplasm of the bone cell became infected.

Here let me say that my early work in this field was undertaken with the firm belief that pyorrhea was a constitutional disease, and the most difficult conclusion for me to accept from the experience, gained in the care of these cases, has been the fact

that the great majority of individuals, suffering resorbative or destructive inflammations of the alveolar process, are suffering from a purely local disorder, and that the cause of most of failures to cure this disease, has been a lack of accurate knowledge of the histology of the root surface, and its possibilities as a culture bed, and lack of proper instruments to accomplish the treatment needed. For the results in both success and failure contraindicate the constitutional theory in nine out of ten cases. One result of my own work has been that I have ceased to search for constitutional causes until I have demonstrated a need for such search by reasons of failure to gain success by local treatment.

In the light of what we now know of the part played by the leucocytes in overcoming bacterial invasion, it seems unreasonable to believe that a bacterial invasion could possibly occur through the blood streams sufficient to cause a pyorrhea, without causing general pyæmia and metastatic abscesses in other parts of the body long before they could possibly determine about the teeth. The great mass of bacteria in pyorrhea pockets is extrinsic to the circulating blood, therefore, the leucocytes cannot attack them until they emigrate from the tissues into the pocket, and the planing of the root surface removes not only their impregnable stronghold, but it also helps out of vessels, and into the pocket thousands of leucocytes by rhexis of the walls of the vessels in the tissue surrounding the pocket, and these leucocytes rapidly overcome those micro-organisms, which were not mechanically removed by the plane.

Of course, I cannot give final figures on all of these cases, for they are scattered from Buenos Ayres to Alaska; but I can say this, that the first noticeable effect of careful, exact root surface removal is immediate, and that there is marked reduction of the cellulitis of the gum tissue, and absolute cessation of pus flow, except in syphilis, during the administration of mercury, though at the present time I am treating a case of a man thirty-eight years of age, who has or had a mucous patch on the tongue, and is in the midst of a course of inunctions, and, while not yielding to treatment in a satisfactory way, is greatly improved by the treatment. There are one hundred and fifty-four of these cases now under surveillance, some of which received surgical treatment five years ago, and this group, while showing occa-



sional minor recurrences, due to uncorrected mal-occlusion, or re-accumulation of soft calculus, is practically cured, showing hard, pink gums, and, except for resorption of the process, and consequent loss of the interproximate gum, and exposure of root surface, do *not suggest* pyorrhea.

Observation of all cases has been continued for a sufficient length of time, however, to definitely settle in the mind of the speaker, that these recurrences are chiefly due to traumatic inflammations, and fermentative process in sordes, for the recurrent attacks have all the characteristics of the original disease. They yield readily to the prophylaxis treatment. I do not believe that the destruction of the alveolar process surrounding teeth is *always* due to either constitutional or local factors *only*. It seems reasonable to me that we should expect the alveolar process to suffer from the results of ill-health, mal-nutrition, and the imperfect elimination of waste materials as much as other parts of the body suffer, and I believe it is reasonable to see etiological factors in mal-occlusion, the accumulation of tartar and sordes around the necks of the teeth, or the positive irritation by foods, driven by the force of mastication between the teeth.

I *never have* been able to succeed with my cases by purely constitutional treatment, nor have I ever succeeded by practicing local therapeutic treatment only, nor have I gained results by thorough scaling or cleansing of the root surfaces alone. All of these means are valuable, but none of them alone yield positive and lasting results, if the surgical removal of the root surface be neglected. If one wishes to gain lasting results in the treatment and cure of pyorrhea, he must direct his treatment to correct all of the possible causative factors, and, while some of these causative factors are comparatively remote, none of them should be neglected, for, by this comprehensive plan, our recurrences have been reduced to less than 30 per cent., and these are due to preventable causes.

If the patient's eliminative functions are sluggish, and faulty elimination is evident, give treatment directed toward opening up of the eliminative tracts. If the specific gravity of the urine is 1025 or 1030, direct patient to drink abundantly of pure water. If the teeth are covered with tartar and sordes, see that they are perfectly freed from those objectionable irritants, and, added to

all of these, recognize the fact that bacterial infection of the porous root surface is always a *perpetuating* factor in pyorrhea. It may not be, and I believe usually is not, an originating factor, but certainly after a traumatic inflammation of the tissues has been accomplished through the medium of imperfect occlusion, irritating matters at the necks of the teeth, or lack of contact, permitting of bruising of the gums, *then* bacterial infection does occur. For it is a fact, that a soft, spongy gum yields to infection where hard, healthy gum is resistant, and an infection can rarely ever be successfully accomplished in such gum tissue. I have repeatedly tried to accomplish it, and find it very difficult to bring about a suppurative process by inoculating hard, healthy gum tissues with pyorrheal pus. The tissues overcome such infection, and, in order to inoculate successfully, you must first create an inflammation by constant or chronic irritation. If this inflammation be once well-lighted, then bacterial infection soon becomes an accomplished fact, and, by reason of the porous nature of the root surface, such bacteria infection is not stamped out or overcome without surgical interference. The root surface being pitted by thousands of small openings due to the destruction of the peridental membrane fibers, becomes a permanent culture bed which receives and maintain pathogenic micro-organisms. These perpetuate the destruction of the bone until it becomes impossible for the longer retention of the tooth.

Regarding the technique of the treatment, it is most important to appreciate, that the porous layer is extremely thin, and is underlaid by a layer, which is comparatively dense, and is the foundation upon which the porous layer rests. This dense layer is interposed between the porous layer and the canaliculi and the lacunae of the cementum proper, and this hard layer should never be penetrated, because, if penetrated, the protoplasm, contained in the lacunae and canaliculi of the cementum, may in turn be infected by pus, and this infection can never be stamped out, therefore the work should be done with planes whose bits or cutting edges are so shaped as to limit their cutting deeply; and the plane should be held with a very light grasp, and should flow over the root surface lightly, sympathizing with its every inequality in such a way as to enable the operator to remove all of the porous layer, and never penetrate to the atypical bone of the cementum. When this operation is accomplished *in this way*,

no matter *what* the original causative factors may have been, the pus flow ceases, absolutely, and granulations fill the pockets; the tissue heals up and becomes firm, and closes about the root. This is the immediate result, and this result can be observed by the patient, himself, nine times out of ten, and is evident no matter whether the first cause was constitutional or local. But to maintain this condition, the first cause must be eliminated, whether it be constitutional or local, that we may maintain hard, tense conditions of the soft tissues overlying the margins of the socket.

Among the extremely important matters regarding the further care of our cases after the root planing is finished, is to see that contact is restored, so that bruising of gums cannot occur, that occlusion is so perfected as to evenly distribute the force of mastication in lines parallel to the long axes of the teeth. This accomplished, we have eliminated one-half of our recurrent attacks, because where a mal-occlusion exists pyorrhea is merely a symptom. Last of all, patiently and carefully, we explain to the patient the necessity of increasing the resistance of the gum tissues, and we show him just how to use his massage brush. To bring this about, we see him often enough to make sure he is using it in such a way as to gain results; we find in some mouths the patient actually causing destruction of the process over the cuspid roots by too vigorous cross-brushing, while in the same mouth we may find an accumulation of sordes on the buccal surfaces of the second and third molars. These inconsistencies are pointed out, and remedied to enable the patient to maintain health.

In this connection, I find the prophylaxis treatment of the greatest value, monthly if need be, and surely often enough to keep the teeth free from fermenting sordes and calculus. This is particularly necessary where there has been great loss of bone and recession of the gum tissues. It is necessary for the reason that the patient cannot keep the increased expanse of exposed root surface clean by his own efforts.

Regarding instrumentation, it is essential to have at one's command not less than three types of plane, one straight, to fit flat surfaces, one out-curved to fit convex surfaces, and one in-curved to enable the operator to fit concave surfaces, and a sufficient number of them to reach any pocket without cramping the wrist, because if the wrist be cramped, one loses one's delicate

sense of touch, and will cut too deep. This need, and the necessity for a blade sharpened at so nearly a right angle as to make it impossible to cut deeply, multiplies instruments, but so long as this multiplication is systematic, it does not increase the difficulty of operation, but rather decreases it, as I have found through experience in our college clinic.

In conclusion, let me say that, what I most ardently wish, is to convince the profession, that pyorrhea alveolaris is both preventable and curable; that the successful dentist must turn his attention to the conservation of the alveolar process; and that prophylaxis is the keynote of modern dentistry.

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## DENTISTRY AS A BRANCH OF MEDICINE SHOULD BE PRACTICED UNDER THE M. D. DEGREE\*

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BY FRANK W. STIFF, D. D. S., RICHMOND, VA.

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It is with some embarrassment that I appear before a body of stomatologists on this subject, nor would I have consented to do it had it not been for my earnestness in the prosecution of the work and that I greatly desire your advice, your criticism, and, if you please, your endorsement.

It is hardly necessary to more than mention briefly the status of the situation in this and other countries, regarding the requirements of a full course in medicine for practitioners of dentistry.

You already know that we must concede to our friends across the waters the honor of inaugurating the movement. In Italy the stomatologists have organized an institute in which only graduates of medicine may secure instruction in that specialty. Similar action has also been taken in France and Hungary. After three years, only medical men will be able to obtain licenses to practice dentistry in Austria and Belgium. And so there are at least five (5) European countries which have taken advanced standing on this question.

Little as yet has been done in America. Under our form of State government it is necessary for each State to take legislative action on a reform of this character. I wish to bring to your

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\*Read before The New York Institute of Stomatology, November 5, 1909.



attention our work in Virginia. Several years ago our State Dental Association appointed a special committee on the subject, authorizing them to endeavor to secure the enactment of a law requiring that before being allowed to practice the specialty of dentistry, a man must qualify in general medicine. This committee consists of ten (10), among them the most prominent men in the State, six of them ex-presidents of the State Dental Association, three members of the Board of Examiners, including the president and secretary of that body, the secretary of the State Dental Association and the chairman of the dental faculty of one of our schools. This statement is made to show the diversity of interests represented on the committee. This committee meets bi-monthly and has unremittingly prosecuted the work since its organization.

As an evidence of the work done and the progress made toward a successful issue, I mention the following organizations which have heartily endorsed the movement and offered their aid:

- The Virginia State Dental Association,
- The North Carolina State Dental Association,
- The Medical College of Virginia,
- The Virginia State Board of Dental Examiners,
- The Richmond City Dental Society,
- The Tidewater Dental Association,
- The Elizabeth City County Medical Association.

Besides these, many prominent individuals might be mentioned, such as the Superintendent of Public Instruction, the President of the State University, the President of the Virginia Pyrotechnic Institute, the Dean of the Medical Faculty of the University of Virginia, prominent legislators and leading men in medicine and other callings.

I have been in correspondence with some of the most prominent men in the dental profession on this subject. These men are well known to every member of this body and to every man in the profession who makes any effort to keep pace with advanced movements by reading the journals and attending our meetings. I feel constrained, because of the encouragement these letters have given us, to quote a few expressions of the writers' endorsement of our work in Virginia. Because of not having

secured the consent of others, I shall name only one of these gentlemen. Dr. Eugene S. Talbot says: "I have been working for 40 years along the line of a medical education for dentists alone. The work you and your colleagues have inaugurated is an 'eye opener' to me and along the exact lines. If one or two other States would do the same, the dental colleges would be obliged to unite with the medical schools and carry out the plans you have suggested. Already the countries of Europe are alive in this direction." In a later letter he says: "Yours is a laudable cause, and you are going about it in the right way to accomplish it. Your plan is certainly ideal. It will injure no one in practice at the present time, and it will make every man in the State proud that the young men who are to take their places in the future will become so equipped that they will be able to treat their patients in an intelligent, scientific manner."

Another very prominent surgeon writes: "It gives me pleasure to read your statements and wish you to know that I am most heartily with you and your confreres." After referring to the organizing in Paris of the Inter-National Association of Stomatologists, a body of men from many parts of the world, the first requirement for admission to which being the M. D. degree, he says, "The work has gone forward in Europe very rapidly," and expresses the hope that at the Inter-National Medical Congress to be held at Budapest in August it will still further advance. He further said: "There can be no doubt in my mind that something must be done to raise the required standard of education for those who undertake to treat diseases of the mouth."

Another very prominent official in the National Dental Association writes: "It is the proper thing. I heartily congratulate you and wish you every success."

Another eminent practitioner, who is especially well known to this body, says: "I have seen a gradual union of dentists with the general medical body approaching for some years, but I have seen nothing which strikes me as being a practical blow struck for that union so positively as this move of the Virginia State Dental Association. If you can induce your Legislature to pass the act of which you speak, and setting a time a few years in advance after which none but medical graduates shall receive the dental examination, you will have taken a very long step

forward." He refers to the acceptance to full membership by the Royal Society of Medicine in England of the entire membership of the Odontological Society of Great Britain, and the refusal of the Inter-National Medical Congress to receive in their oral Section any individual not holding the M. D. degree.

Still another, the dean of one of our greatest schools, writes: "I am a believer in the training of the dental student in medicine and allowing him to elect, in his first year of medical work, the dental subjects, and allowing those dental subjects to count toward his medical degree as much as his dental degree, and then, with an addition of a fifth year, complete his dental course."

One other also says: "This has been the dream of my life, and if I can see it accomplished in one State, I believe that it will be the entering wedge, and I know of nothing that could give me more unalloyed happiness." There are more, but these will suffice to show the encouraging tenor of them all.

We have never presented the matter before any body of professional men, medical or dental, that it was not endorsed, with the exception of one of our schools, the dean of which confessed that he objected only because he thought it would injure his school financially.

Our greatest difficulty has been to devise a plan of education which will cover the ground of the present medical course plus the dental branch in a reasonable time. There is so much of medicine already for even the specialist to study, that it seems hard to increase the burden. For, mind you, we cannot escape the logical sequence of the adoption of this plan—if dentistry be recognized as a legitimate branch of medicine it will be as necessary for medical students to study the theory of dentistry as for dental students to qualify in the other medical branches.

We will not be able at first to secure this, and can only hope to gain the recognition of dentistry as a branch by first requiring that our dental students shall qualify in medicine and dentistry before practicing the specialty. This will place dentists, educationally, on a superior footing to physicians. We will be entitled to the M. D. degree, having qualified for it, and will be the specialty of dentistry plus.

Now I do not like to trespass unduly upon your time, and yet I feel that I would not accomplish my purpose if I did not

give some reasons why dentistry should be practiced as a specialty under the medical degree, and just how we, in Virginia, propose to teach the medico-dental student. I will not have time to elaborate on these reasons, nor will it be necessary before this audience.

1. Dentists never will have the standing with the medical profession nor the public that physicians have, so long as they practice under the D. D. S. degree. Nor should they. Let us be frank. We are a branch of medicine, the only branch of medicine being practiced under a different degree from all other branches; the other branches filling the requirements of a full medical course and we failing to do it. We have not qualified.—we know it, the medical profession know it, and the public know it.

We need not attempt to conceal the fact. It is as futile as the effort of the ostrich to hide by sticking its head in the sand. Dentists, as a body, do not occupy a position in society equal to that of a physician and never will under the present regime. Less than a month ago I heard that a lady expressed surprise that a young friend of hers did not aspire higher than to marry a dentist. Some claim that dentistry is a special science distinct from medicine and do not accept my premise. This contention cannot be sustained, for if medicine is the science which treats of the diseases of the human body, their prevention and cure, then dentistry must be one of its branches, as it treats of one of the most important parts of the body, not only to prevent and combat local diseases, but constitutional as well, the mouth being the gateway of the body through which pass most of the active microbic agencies which give rise to so many of our ills. This view is sustained by the eminent editor of *The Dental Brief* in these words in an editorial criticism of the following paper on this subject by the essayist: "The contention that dentistry is a specialty of medicine, and that its principles should form a part of the general medical course, is incontrovertible."

2. Being on a plane with other specialties, they will more often consult us to the mutual benefit of the profession and the public.

3. Because of the higher preliminary requirements necessary under this plan, a better grade of men will enter the pro-



fession. Better and more extended service being rendered, better fees will be demanded and fewer cheap Johns and quacks will be found, for the reason that the more highly educated the man the less likely he is to belittle and degrade his profession.

4. If on account of health, natural fitness or other causes, it is found desirable, we can, at will, take up general medicine or any other specialty, whereas now this cannot be done for various reasons.

5. We will be allied with the great men of medicine in any effort we may make before legislatures or other bodies.

6. We will be entitled to membership in medical bodies and to appointment or election to posts of honor, now only open to medical men. We will then stand on equal terms with surgeons in the Army and Navy and not, as now, be employed under contract without rank.

The hiatus which separates the dentist and his field from the general practitioner or other specialist, will be obliterated, and there will be mutual co-operation for the good of the public. It is not necessary to amplify upon the fact that the mouth is the index to many constitutional diseases, and if the body of dentists were sufficiently instructed in these oral manifestations, much suffering and many lives would be saved by their early discovery in the dental chair, and reference of the patient to the proper specialist for treatment in incipency when most easily controlled.

Diseases of the face, jaw and teeth are closely related to diseases of other parts of the body. A competent authority says that germs of the mouth produce tuberculosis, actinomycosis, osteomyelitis, thrash, anthrax, erysipelas, ulcerative and gangrenous stomatitis, pyorrhea alveolaris, and caries.

Our opportunities are so superior to those of the physician for observation, comparison and study of the human system in health and disease, that we would be a valuable aid to him in his work. Looked at from any point of view, it seems the sane, logical thing to do; require that the dentist of the future shall qualify as other specialists of medicine do.

It will naturally be asked how dentistry can be added to the general medicine without undue expense and unreasonable length of time spent upon professional education. I believe it can be done in either of two ways:

So arrange the curriculum that after taking two years of medicine a student may select what specialty he will practice, and devote the most of his time to that branch, only spending the necessary time upon the others to master theory. The field of medicine is already so large, there are so many specialties, that this is now found to be necessary in many schools, Harvard for one, and others, I am told.

Another plan, the one likely to be adopted in Virginia (as by the other our school would be forced out of the National Association of Medical Faculties), is to give the student the regular four-year medical course as now taught, and, following each session, require the dental specialist to attend a post-course of two or more months for the study and practice of dentistry. Having medicine proper entirely eliminated from his mind, he will be enabled to do better and more effective work in the eight or more months than he does now. In the consideration of this plan we must not forget that a large part, if not the most, of a dental student's time is now spent in medical studies. One of our schools, the Medical College of Virginia, one of the oldest in the country and of high standing, has agreed to teach by this plan, should the law be passed. The product of this course, the medico-dental graduate, will be required to pass the Board of Medical Examiners, on which will have been appointed two or more dentists to examine on the subject of dentistry.

I fear I have tired you. I know I have presented my views very imperfectly. I court a free and frank discussion, for I came to you not to teach but to learn. If I can, from your criticism of this paper and the subject, carry back to Virginia with me some suggestion or advice which will help us in our endeavor to elevate and improve the profession of dentistry, my effort and my journey will not have been in vain. I thank you for your kind invitation and your patient attention.

## INFANT DIET A FACTOR IN DENTAL IRREGULARITIES AND DECAY.\*

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E. A. BOGUE, D.D.S., M. D., NEW YORK, N. Y.

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Mr. President and Members of the American Academy of Dental Science:

It is with some hesitation that I venture to bring before you the subject upon which Dr. Sim Wallace, of England, has labored for so many years, and I wish to acknowledge my indebtedness to him for many of the points that I shall present to you.

I wish also to make acknowledgments to Dr. Henry J. Hartz, of Detroit, and then to thank the large following of Mr. Horace Fletcher for the attention which they are giving, intentionally or otherwise, to the subject in hand.

We have all noticed, in looking for immunity to dental caries, that the teeth that are most rounded on the sides are more apt to be immune to decay, as well as more regular in position, than those which are flattened.

Regularity in position is conducive to self-cleansing, which takes place through properly performed mastication. Rounded sides mechanically shed all food that is not sticky in character, especially when that shedding is aided by the forces of mastication, which cause the flow of saliva.

Rounded sides and regularity of position are two elements in the environment emphasized by Dr. Black, that have not been as seriously considered as their importance demands.

Flattened teeth are generally not completely covered by the enamel coat of mail, and so crevices are left that the trituration of food cannot clear out, making decay inevitable, for food debris ferments, becomes acid, and produces the bacteria of decay.

Teeth with crevices and flat sides are an indication of constitutional weakness, and are found to be also irregular in position, more often than any other kind of teeth.

Irregularity is conducive to decay, because physiological cleanliness is impossible, as it is a mechanical impossibility for the tongue, lips and cheeks to remove the detritus of food from irregular teeth.

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\*Read before The American Academy of Dental Science, December 1, 1909.

How, then, can we secure regular teeth, well rounded and well covered with enamel? We need to begin with the infant, to make sure that its food, and the manner of taking it, are both conducive to the child's health. We need to guard the baby against taking cold, as well as against disorders of stomach and bowels; but as our subject is especially diet, we will confine our attention to that point. All the bones of the head and face grow most rapidly during two distinct periods. First, from birth to the sixth or seventh year, and again from the thirteenth year to adult life; that is to say, about the nineteenth year in girls and the twenty-first year in boys.

The most important period for our consideration is from the third to the sixth year; for it is then that the palate in its growth is descending and passing the eustachian tubes and the positions of the teeth, both temporary and permanent, are being determined. At the same time, the deepening of the glenoid fossae by the growth of the "*ementia articularis*," changes the slight depression of the glenoid cavity into a deep one and determines the position to be occupied by the head of the ascending ramus of the mandible.

The accurate level of the eyes is dependent upon sufficient growth and proper enlargement of the bones of the face; good vision in both eyes results from an accurate level; and the lack of it causes defective vision.

Defective development of the face leads to diminished nasal passages.

The question therefore arises, can anything be added to, or taken from, our present mode of living that shall restore to the coming generations that normal development that is conducive to sound health, strength to resist disease, and the greatest physical beauty, all of which were the heritage of peoples who have lived nearer to nature?

Up to the sixth year of the child's life only the temporary teeth are visible, and within the last few years careful observers have noticed that they are excellent indices of the stage of development of the parts beneath.

So little attention has been paid to these temporary teeth, not only by medical and dental writers, but practitioners as well, that those who follow most strictly for their young children the regi-



men laid down in the books for the special instruction of mothers are likely to have the most complete wrecks among the temporary teeth, consequently the poorest digestion and development.

Dr. Wallace states boldly that the children of physicians in England have generally the worst teeth.

As there are no superfluous organs in the body, if any of the teeth are missing mastication cannot be properly performed, and this applies to temporary as well as permanent teeth.

If not properly performed, whether from inability or inattention, an undue burden is thrown upon the internal organs of digestion and assimilation which in their efforts to get rid of the superabundant material thrown in upon them in a crude, unprepared state, often break down and serious diseases result.

Profound researches into the causes of dental decay have been made by a number of careful students, and among them two may be mentioned whose work is perhaps more widely known in this country than any of the others—Drs. Miller and Black.

Dr. Miller dealt exclusively with the immediate causes of decay—bacteria.

Dr. Black summarized his work in the single word, "environment."

Dr. Wallace goes back of both and emphasizes the character of the food, by means of which he proposes to modify environment and to build up a physical system from the very beginning, which shall have the strength to resist the long list of so-called children's diseases and to develop permanent organs of mastication, along with the habit of masticating so in accord with Nature's laws, as to more nearly approach normality than has been possible in our civilized communities for any save a very small minority.

The influence of thorough mastication and insalivation upon adult nutrition, has lately been shown in the person of Mr. Horace Fletcher, and more lately through the nine students, who were scientifically studied by Prof. Fisher, of Yale, aided by Dr. Anderson's observations.

These gentlemen, after carefully detailing the steps of their experiments, show that the strength of the young men was in no case diminished, while in a few cases it was increased, but that in all cases the powers of endurance were considerably

enhanced by thorough mastication, and thorough mastication resulted in a largely diminished intake of food, with a tendency toward a vegetable diet.

Visiting the fisher folk of the north of Scotland, where oat-meal cakes are found commonly, it is noticed that many of those who are advanced in years still have good teeth and fine physical development, including normally developed faces.

The same is true in Sweden and Norway and in parts of Denmark, where hard bread is the rule.

In Germany the peasant class use hard bread with much crust and their physical development is generally good, while the teeth are equally good, so far as observation and inquiry went. The higher classes, on the contrary, are characterized by frail teeth, prone to decay, soft food, indoor life and lack of physical exertion contributing to this result.

In France, where hard bread is the rule for all the people and where all the babies are, with few exceptions, nursed by their mothers, the teeth of all classes, so far as my observations went during twenty-three years, were better than they are here in America.

It may be said, parenthetically, that the teeth of adults in Normandy are more prone to decay, according to Magitot, than in most other portions of France; which fact he attributes to the constant use of sour cider.

The same conditions of teeth are found in Italy, where much the same habits of life prevail as in France, and where, as I am informed by Dr. Terry, of Milan, bottle feeding is practically unknown, all babies being brought up on woman's milk, either their mother's or a wet nurse.

Notwithstanding this, it is noticeable that in northern Italy the peasants are especially liable to have decay among the upper incisor teeth.

In Switzerland, especially in the cantons of St. Gall and Appenzell, the teeth of the adult peasants are noticeably bad, although they use coarse food; but it is also noticeable that they use a great deal of dark rye bread, which is very moist, slightly sour, and prone to ferment.

The Roumanian peasants live mostly on "mamaliga," identical with the Italian "polenta," or corn mush. Added to this, they have cheese, leeks, bacon and cabbage.

Yet Dr. Zentler assures me that they almost uniformly have good teeth; their outdoor life and the necessary mastication of these latter articles of food doubtless contributing to this result.

Dr. Pedley, of Rangoon, India, has shown, in a paper published in the Journal of the British Medical Association, that infants get their first nourishment not so much by sucking, as by biting the breast, and so pressing out the milk, while at the same time the growing jaws are enlarged by the pressure of the breast in exactly the right direction.

These facts, with others, have led Dr. Wallace to pronounce against the present system of soft diet for young children generally as being a mistake.

Dr. Wallace says in a recent paper in the British Dental Journal (July 15th, 1908):

"Now for the first six or nine months of a child's life it has been accustomed to extracting liquid from the mother's breast and through all the ages of man's evolution nothing was mixed with this milk. When the first article of food was presented to the child, it was given at a different time from the sucking of the milk. I think it must be obvious that in a state of Nature it was utterly impossible to soak food in milk in order to effect the transition from mother's milk to the ordinary food of children and adults."

"Now what happens when an infant, hitherto accustomed to milk, is given bread, well soaked in milk? The first noticeable effect is that the infant gulps down the milk-soaked bread and milk, without any attempt at retaining it in the mouth, or mixing it with saliva. The starchy matter in the bread is, therefore, washed into the stomach, without any insalivation, without any conversion of the starch, and without any preparation for digestion in the stomach.

"The physiological effect, which the retention and mastication or gnawing of food in the mouth produces, is practically lost, and the flow of digestive juices in the stomach is correspondingly lessened.

"If the child coughs, chokes and splutters, can we be surprised?

"At a later stage, say about the thirteenth month, when the first temporary molars have taken their positions, what happens when the child is restricted to this soft diet? The pre-

vious troubles continue and the teeth get dirty and tender from want of use; later they become carious, and the tenderness increases, while for the same reason mastication is not performed, and so these troubles and others, resulting therefrom, become more or less thoroughly established."

Why shuld not educator crackers, chop-bones, a long strip of round steak, too large to swallow, or buttered toast, be given to the newly weaned baby to help it exercise the masticatory muscles, and so develop the surrounding parts, bones included. Later on little rolls or flutes of bread with hard crust can be obtained and it will be found that baby is far better pleased with such food, of which he can get but a moderate amount at a time, than with a large dose of milk-soaked bread or toast, much of which he is likely to throw up. The child should be discouraged from using drink of any kind while eating. It will be found, as he grows up, that he will require less solid food than as though the food were washed down with drink. While this food, being well chewed, will become insalivated, and better prepared for digestion, the function of the masticatory muscles being brought into play will stimulate into growth all the surrounding parts.

Professor William H. Howell in his address published in "Science," of January 21, 1910, says: "If a muscle is stimulated to greater growth by an excess of functional activity, the substances given off to the blood during its metabolism act favorably upon the growth of other muscles which are not directly concerned in the increased work, or upon the connective tissue surrounding and permeating the muscular mass; and conversely, the development of connective tissue from any cause aids directly by its secretions or excretions in the growth of the muscle. There is thus established a "*circulus benignus*" by means of which each tissue profits from the functional activity of its fellow tissues."

Prof. Rotch, of Harvard, has recently shown us how the bones participate in developmental activity through activity of their muscular attachments.

Dr. W. A. Shannon, of the Seattle School Board, tells me that he is one of eight children, all of whom were brought up on a farm in Canada, and received only mother's milk up to the time when they could sit at table with the family, and be



given a crust, or a bone to gnaw, or a bit of toast with butter on it, to bite and suck at, so that the first efforts at taking solid food involved the performance of the natural functions of the jaws and the teeth, as soon as there were any.

This exercise of function resulted in a fine dental and nasal development of all these eight children, not only, but of all the children in the immediate neighborhood, who were brought up in the same way. None of these children had dental troubles, and none of them wore glasses. There was not a dentist within thirty miles, and for twenty years no dentist came to the village.

No one of the eight children of his own immediate family ever had occasion to consult a dentist for the first thirty years of their lives.

None of them bore the marks of ever having had adenoids; and his belief is that they were practically non-existent in that neighborhood, while now, with the present system of feeding children on soft foods, requiring little or no mastication, adenoids are very prevalent everywhere.

There seems to be such an intimate relationship between the dental arches, the maxillae, the nose and the face, that, when narrow upper jaws are spread, even for adults, the nasal passages are also enlarged, and if the enlargement is retained, the face will later on show a corresponding increase. *Per Contra*.

It is a well known fact that organs that are not used suffer atrophy. The stiff and withered arm of the Indian dervish comes readily to mind as an illustration.

If such an amount of injury can be caused by the disuse of a member that is fully formed, who can estimate the amount of injury inflicted by the disuse of organs in process of development, that are dependent upon use, that is—the proper performance of function for their formative impulse.

It will readily be appreciated that if, as in the cases of Dr. Shannon's neighbors, and the French and Italian children, the infant derives its exclusive nourishment from the mother, up to the time when it can take its place at the table and be given a crust, or a bone to gnaw on, or a bit of toast and butter to suck, the functions of the jaws are being performed, while if pap or soft food be administered they are not.

Ten children are now being brought up in London on these

lines, and up to the present time not one of them has suffered from any of the so-called children's diseases, nor have adenoids made their appearance among them.

Finally I would refer you to Dr. Ottofy's paper in the Dental Cosmos for July, 1908, on "The Teeth of the Igerots."

He says that the Igerots are living in the most primitive conditions, uneffected by either the benefits or vices of civilization.

The examination of their teeth showed almost perfect arches and only two per cent. of decay over against about twenty per cent. in civilized races. (He might have written seventy-five per cent.)

Dr. Ottofy gives as the reason for the perfect condition of the teeth of these people, the character of their food, which requires much and severe mastication and their open air life.

The use of hard food begins as soon as they have temporary teeth to chew with, and Dr. Ottofy says that the children chew rice between meals.

Dr. Hawley, in his presidential address to the American Society of Orthodontists, calls attention to the fact that "there must be a radical change in the selection and preparation of the food of a child until the denture is complete."

He says that we do not need to return to barbarism, but that all the changes that are necessary can be adapted to our present mode of living.

Dr. Hrdlicka, who has lived among the Indians for months at a time, informs me that several of the tribes habitually chew gum, and so contribute to the functional activity of the parts involved.

Dr. Lawrence Baker to-day showed me photographs illustrating some experiments that he has made on, I believe, two of a litter of rabbits. These two had the teeth upon one side ground down so that mastication upon that side was impossible. Hence, function of that side was not fulfilled. These conditions were maintained for about seven months, and then the whole litter was killed, and the skulls cleaned for examination. The two that were mutilated were found to have the mandible much smaller on the mutilated side, causing a deflection to that side. This deflection was shared by the upper maxillary and the nasal

passages as well, which were both smaller on the mutilated side, causing, necessarily, curvature of the nasal septum.

This diminution of size continued right on up through the skull, the mesial suture of which was deflected toward the side of the mutilation, while the whole brain cavity on that side was visibly smaller than the other side. The weight of these two skulls was less than that of the other skulls, belonging to the same litter. All of which goes to prove the necessity of the performance of function during the periods of growth, and the inevitable deformity when this functional activity is interfered with or suspended.

Dr. Baker further reports that "this variation was not confined entirely to the bones of the head, for the bones of the thorax were also found to be distorted; in both cases the sternums were deviated, the ribs were twisted, and there was a spinal curvature in the dorsal region."

Dr. Baker also reports that

"This experiment strongly indicated how important is the masticatory equipment of man to the development of the head, and it also brings fresh illustration of the importance of the sadly neglected temporary dentition which serve during the important developmental period of childhood."

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## ORAL PROPHYLAXIS AND ITS RELATION TO PYORRHEA ALVEOLARIS.\*

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The terms Prophylaxis and Prophylactic are synonymous according to both Webster's and The Century Dictionaries. Both mean preventive, to guard or defend against disease. My purpose, however, is not to discuss the correctness of the terms as applied to the treatment of the oral cavity, nor do I wish to begin a controversy concerning whether the pathological condition with which we have to deal should be designated as Pyorrhea Alveolaris, Interstitial Gingivitis or Phagedenic Pericementitis.

Cleanliness is the keynote of health. Until recently, oral sani-

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tation has been completely ignored by the great majority of the members of our profession, even many of our eminent men having been content to do repair work in mouths reeking with filth and disease and then declare the mouths in perfect condition. This I know, because I have seen hundreds of such cases. Even when the teeth have been cleaned the work has been superficial in the majority of cases, so that cleanliness has been only relative and in many instances a negative quantity.

When we consider the fact that pathological conditions in the oral cavity are the result of bacterial activity, we can readily see that even infinitesimal amounts of decomposable matter will, in some mouths, be sufficient to bring about inflammation which will, if neglected, result in most serious pathological conditions.

It is true that constitutional resistance plays a most important part in the establishment of disease, but constitutional resistance, if sufficiently high, merely renders a person immune when exposed to the real cause of the disease. Lack of immunity is not the cause. If one who is not immune is exposed to infection he will contract the disease, but not otherwise.

We know that caries of the teeth is caused by bacterial action and yet we often see mouths in which favorable conditions exist without caries and we say that such mouths are immune.

We also occasionally see mouths in a filthy condition in which there is no pyorrhea, but that is no proof that filth does not *cause* pyorrhea. It simply means that in such an individual some inhibiting power is present which makes the bacteria harmless.

On the contrary, there is sometimes pyorrhea in apparently clean mouths, which are at the time being well cared for, but often these mouths became infected at a prior period when such care was not exercised; or in spite of the efforts on the part of both patient and operator, *perfect* cleanliness together with proper stimulation has not been accomplished.

I believe that it is impossible for pyorrhea to become established in a mouth that has always been kept clean, and also that a recurrence is practically impossible after a *perfect* operation, unless through lack of proper prophylactic treatment. This opinion is not based on theory, but is the result of observation of hundreds of cases during a period of more than fifteen years.

We have in the mouth an ideal incubator, and an ample quan-



tity of excellent culture medium in the shape of food debris. We know that bacteria are present, for it is impossible to thoroughly sterilize the mouth. Unless some inhibiting force is present, cultures will be established and the result will be exactly what might and would be expected if similar conditions were to exist on a lacerated surface of the body or in any other tissues of the anatomy. This condition is present on a mucous surface, which not only offers no resistance but is highly absorbent. Why then should we regard Pyorrhea Alveolaris as mysterious and obscure, and spend so much time groping around in the dark for a cause? If a surgeon were to permit a condition such as has been described to exist in a wound, what do you suppose he would look for as a result?

Those of us who have been extensively practising oral prophylaxis know that it is *truly* preventive as far as Pyorrhea Alveolaris is concerned. We have conclusively proved that this is so, not once but hundreds of times; not only in mouths in which no suppuration has ever existed, but in those which have exhibited most aggravated cases of Pyorrhea and in which conditions have been most unfavorable to the maintenance of oral cleanliness.

Prophylaxis means prevention, not merely cleaning the teeth, and as such embraces all work which is necessary to preserve a healthy condition. All mechanical restorations such as fillings, crowns, bridges, etc., must be as perfect as possible in order not to injure the tissues or collect food debris. Malocclusion must be corrected whenever possible. Sometimes one or more of the teeth may be under such stress in occlusion that the supporting tissues are injured so extensively that their vitality is reduced sufficiently to render them an easy prey to infection. In such cases these teeth must be ground until they are entirely relieved of unequal pressure in any of the positions assumed in mastication.

Septic teeth must be sterilized or removed, as their retention in a septic condition will surely result in disaster whether an alveolar abscess is formed or not. You may think it strange that I should mention this in connection with prophylaxis, but we must make the teeth clean inside as well as outside. Within the last year I have treated two cases in which abscess of the antrum resulted from the retention of molars that were septic and discharging through the alveolus without any fistula at the usual point.

The first thing to be done in mouths that have been neglected, is to remove all teeth that cannot be restored to health and usefulness, as their presence otherwise would make prophylaxis as regards the rest of the mouth impossible.

After Pyorrhea Alveolaris has been cured the patient must be seen at frequent intervals until normal tone has been restored to the tissues. The frequency with which the teeth should be polished must be determined by the operator in each individual case. This will depend largely on the success of the patient in his efforts to keep the mouth clean, and on general conditions, as in some mouths bacterial accumulations are much more profuse and rapid than in others. I have seen cases which needed cleaning within a week from the time the patient was dismissed and have accomplished all that was necessary with the tooth brush and floss. On the other hand, I have seen a number which did not even require the least attention six months after treatment and these were cases in which the most aggravated pyorrhea of long standing had formerly existed.

Usually after pyorrhea has existed the tissues are rather low in vitality and especially susceptible to irritation of any kind. We must, therefore, exercise particular care in cleaning the teeth, making them *perfectly clean* on every surface to which there is no tissue attached, whether covered by tissue or not. The act of polishing, whether accomplished by means of the stick or properly formed flexible rubber points, and supplemented by wide flat floss, will stimulate; but I believe that too much importance has been attached to this point. It is more the removal of matter, which if allowed to remain, would prove injurious, that accomplishes the desired object. Rotary brush wheels on the engine are an abomination and do infinitely more harm than good when brought in contact with the soft tissues, but properly constructed soft rubber discs and cups, if kept wet and not rotated very rapidly or pressed too hard, may be used to great advantage. The stimulation which is needed may be best accomplished by the use of the tooth brush on both gums and teeth, and by massage with the fingers.

As before stated, it is impossible to produce a sterile mouth, but the presence of bacteria is not necessarily harmful. It is the culture of bacteria that works injury. Our first aim should

be to have the patient remove, immediately after eating, as much of the food debris as possible, as it is this on which bacterial cultures are established. The perfect removal of such materials is also impossible; therefore, we must employ as a dentifrice or wash some germicidal preparation tolerable to the tissues, which will prevent bacterial growth. It is desirable also that such a preparation contain materials which are astringent and tonic, especially in mouths where a decided tendency to inflammation is present.

I have found it very beneficial to have the gums massaged before retiring with a paste possessing the aforementioned properties, leaving as much of the paste as possible around the teeth all night. In the morning the teeth should be brushed with the paste for the purpose of removing the mucoid accumulations. This establishes a sanitary condition and presents polished surfaces to which food debris will not so readily adhere as to a roughened surface. After each meal the mouth should be thoroughly rinsed before brushing in order to remove any particles which may be lodged around the teeth, and then brushed either with the paste or the liquid preparation for the removal of the coating which is adherent. It is advisable to allow a little of the preparation to remain in the mouth.

The method of using the brush should be demonstrated to the patient and if there is evidence that this is not being done properly, it must be demonstrated again. The use of floss is sometimes desirable, but not necessarily so in every case.

Thorough co-operation between patient and operator is imperative, and successful results are impossible in the majority of cases unless the patient is careful to carry out the instructions given. In order to determine whether or not this is being done it is wise to have the patient report for examination within a month from the time the treatment is given, whether recurrent treatment is needed or not. As time advances and the tissues become more resistant the interval between prophylactic treatments can usually be lengthened.

If prophylactic treatment will prevent recurrent pyorrhea, how much more simple is the prevention of the initial occurrence. With possible rare exceptions pyorrhea alveolaris is entirely unnecessary and preventable. Is it not much better to preserve health by cleanliness than to seek a means whereby the tissues may be made immune to injury in spite of the presence of filth

in greater or lesser quantities? The mouth must be so treated that it will keep clean, just as we bathe our bodies in order to keep them clean and to maintain a healthy circulation and elimination of waste products. Keep the mouth clean and it must be healthy.

Proper prophylactic treatment by both operator and patient removes the deleterious matter which is introduced into the mouth, together with what may be formed by the presence of such matter, and stimulates capillary circulation, so removing the waste matter from the broken-down tissues, and supplying nutrient material for the upbuilding of the tissues. Thorough mastication is also an essential to the preservation of the health of the teeth and their supporting tissues. The organs of mastication must have their normal amount of exercise, otherwise circulation will become sluggish and they will lose their tone and resistant power, becoming more susceptible to any infection. This may and does take place in spite of high constitutional resistance.

Susceptibility of the oral tissues to infection, except in rare instances, is entirely a question of *local* resistance. This I have proven in a number of diabetic subjects whose mouths exhibited advanced cases of pyorrhea. Without recourse to any constitutional treatment whatsoever, health was restored by local treatment, the tissues healing in about forty-eight hours after surgical treatment.

I have no doubt that in cases where diabetes, syphilis or other serious systemic disorders are coincident with pyorrhea, the pyorrhea antedates the constitutional disorder and has been accentuated but not caused by such disorder. If such mouths had always been under prophylactic treatment I believe there would be no pyorrhea. The amount of tissue lost, both hard and soft, indicates that the process of destruction has covered a period of many years and could not have taken place within a comparatively short time. Usually pyorrhea in some stage exists long before it becomes manifest to either the patient or the dentist and so the error of believing it to be of recent occurrence is often made.

Any man who conscientiously practices oral prophylaxis is conferring upon humanity the greatest boon of which he is capable as a dental surgeon and if the practice becomes universal, therapeutic treatment will become almost entirely unnecessary.



FURTHER STUDY OF SOMNOFORM ANAESTHESIA  
AND SUMMARY WITH TABULATION OF  
RECORDS OF ONE HUNDRED AND  
TEN CASES.\*

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ALBERT L. MIDGLEY, D. M. D., PROVIDENCE, R. I.

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The prime essential of an anaesthetic to be of use in any branch of surgical science is safety and the degree of safety which it possesses is always in direct ratio to the amount of depressing or other unpleasant influences which it exerts either during or after the administration. To be of real value this requisite of safety must prevail, even though the patient be a sufferer from cardiac, pulmonary, circulatory, cerebral, nephritic or other organic diseases. In addition to the quality of safety, to be ideal and to be of real use in the many operations which the fields of dental and oral surgery invite, an anaesthetic should induce anaesthesia with a reasonable degree of quickness, but at the same time its rapidity of action should cause no depression, shock or other dangerous conditions. Moreover, it should produce a fairly lengthy operating narcosis and also be pleasing to the senses of taste and smell and lack a pungent or offensive odor. Furthermore, it should have no exciting or depressing influences on the heart, lungs, kidneys, stomach or other organs.

It is the purpose of this paper to learn from a study of both the clinical and physiological actions of somnoform how many of the above named qualifications it possesses and also the extent or degree of these qualities. It would be unfair either to condemn or commend an anaesthetic from the observations and deductions drawn from a close study of the records, tabulations and summary of one hundred and ten cases† with the added experimental knowledge of twice that number of administrations not tabulated. Yet an opinion formed from such experience and study has some value and is submitted for your consideration.

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\*Read before The Academy of Dental Science, Boston, January 5, 1910.

†Fifty cases tabulated with this paper, the other sixty tabulated and printed with paper on Somnoform which appeared in *The Journal*, Vol. III., No. 4, December, 1908; page 306.

# SOMNOFORM ANAESTHESIA RECORDS 1908-09

Case No.	Record Book No.	Age.	Sex.	General Physical Condition.	Method of Administration.	Degree of Anesthesia.	Quantity.	Induction.	Narcosis.	Pulse.			Respiration.			Eye.			After Condition.	After Effects.
										Before.	During.	After.	Before.	During.	After.	Pupil.	Corneal Reflex.	Eye Ball.		
61	9247	31	F.	-----	Som. alone	Deep complete	3 cc	56"	1'	84	84	102	21	38	26	Dil.	Ab.	-----	Very good	No unpleasant symptoms.
62	9252	23	F.	-----	" "	" "	3 cc	1'	1' 10"	88	91	90	18	21	18	Dil.	Pres.	-----	Very good	No unpleasant after effects.
63	9255	31	F.	Good	" "	" "	3 cc	1'	1' 25"	108	102	96	20	24	22	Dil.	Pres.	-----	-----	Slight Nausea and dizziness.
64	9319	15	F.	-----	" "	Very light complete	3 cc	1' 15"	40"	132	80	96	24	24	17	Dil.	-----	-----	-----	Faulty administration.
65	9323A	24	F.	Good	" "	Deep complete	3 cc	33"	1'	84	96	81	30	25	21	Dil.	Ab.	-----	Very good	No unpleasant after effects.
66	9325	24	F.	Good	" "	" "	3 cc	30"	50"	51	04	66	31	20	24	Dil.	-----	-----	Very good	-----
67	9325	14	M.	Good	" "	" "	2 cc	43"	1' 5"	90	96	96	24	24	19	Dil.	Ab.	-----	Good	Slightly dizzy.
68	9385	18	F.	-----	" "	" "	3 cc	45"	50"	88	94	76	24	22	24	Dil.	-----	-----	-----	Slight nausea, extremities numb.
69	9386	39	M.	-----	" "	" "	3 cc	45"	60"	120	110	92	24	24	20	Dil.	Ab.	Set	-----	Slight headache.
70	9390	18	M.	-----	" "	" "	3 cc	56"	58"	84	112	92	20	26	20	Dil.	Ab.	-----	Very good	Slight dizziness.
71	9400	29	F.	-----	" "	Uncertain	Faulty 3 cc	-----	45"	76	134	80	20	24	24	-----	-----	-----	-----	No unpleasant after effects.
72	9403	23	F.	-----	" "	" "	3 cc	45"	5"	83	96	80	21	26	24	Dil.	Ab.	-----	-----	Involuntary micturition. Slight nausea and numbness of extremities.
73	9472	36	F.	-----	" "	Deep complete	3 cc	1' 31"	32"	108	128	108	32	42	32	Dil.	-----	-----	-----	No unpleasant after effects.
74	9539	22	F.	18 months Pul. Tuberc.	" "	" "	3 cc	50"	55"	84	84	80	20	24	21	Dil.	Ab.	-----	Good	Much dizziness and numbness of extremities.
75	9584	26	M.	-----	" "	" "	3 cc	1' 7"	58"	120	120	108	20	30	21	Dil.	Pr. s.	-----	Good	Slight headach and dizziness.
76	9585	39	M.	-----	" "	" "	3 cc	1' 10"	68	83	92	24	18	20	Dil.	Pres.	-----	Very good	No unpleasant after effects.	
77	9588	34	F.	-----	" "	Uncertain	3 cc	-----	53"	84	-----	84	21	18	24	-----	-----	-----	Very good	Slight numbness of lower extremities.
78	9589	20	M.	-----	" "	Light complete	3 cc	56"	22"	112	88	101	21	16	24	Dil.	Ab.	-----	Very good	No unpleasant after effects.
79	9590	23	F.	-----	" "	Deep complete	3 cc	1' 3"	1'	68	108	84	21	20	20	Dil.	Pres.	-----	Good	Slight headache.
80	9735	34	F.	-----	" "	" "	Faulty 3 cc	1' 5"	45"	84	80	62	24	20	30	Dil.	Ab.	almost	Fair	Involuntary micturition. Weak generally.
81	9950	21	F.	-----	" "	Very deep complete	3 cc	1' 10"	1' 10"	164	97	69	21	42	26	Dil.	Ab.	-----	Good	Slight numbness of extremities.
82	10011	22	F.	-----	" "	" "	3 cc	-----	106	60	90	34	20	24	20	Dil.	Pr. s.	-----	Very good	No unpleasant after effects.
83	10016	18	F.	-----	" "	" "	3 cc	1' 7"	45"	80	106	76	20	20	20	Dil.	Ab.	-----	Good	Slight headache.
84	10057	27	M.	Very good	" "	Light complete	3 cc	1' 10"	40"	84	76	84	18	22	18	Dil.	Pres.	-----	Very good	Case 86, same patient. No unpleasant after effects.
85	10131	28	F.	-----	" "	Deep complete	3 cc	1' 39"	1'	80	84	62	19	36	24	Dil.	Ab.	-----	Poor	Weak pulse, severe headache, vomiting, numbness of extremities, weak generally, no stimulation.
86	10133	27	M.	-----	" "	" "	3 cc	1'	1' 10"	80	71	72	17	22	20	Dil.	Ab.	-----	Very good	Case 84, same patient. No unpleasant after effects.
87	10260	13	M.	Good	" "	" "	3 cc	1'	45"	96	120	102	20	33	28	Dil.	Pres.	-----	Very good	No unpleasant after effects.
88	10262	29	F.	283 mths. Pregnant	" "	Very light	Faulty 6 cc	1' 45"	40"	108	108	72	24	36	24	-----	-----	-----	Fair	Severe pain in stomach, slight headache.
89	10263	51	F.	-----	" "	Deep complete	Faulty 6 cc	2'	1' 5"	90	108	81	24	33	24	Dil.	Pres.	-----	Good	Practically no unpleasant symptoms.
90	10268	51	F.	-----	" "	" "	3 cc	40"	1' 20"	80	136	84	28	38	27	Dil.	Ab.	-----	Very good	No unpleasant after effects.
91	10409	36	M.	-----	" "	" "	6 cc	1' 55"	1' 20"	72	76	60	18	26	17	Dil.	Ab.	-----	Very good	No unpleasant after effects.
92	10464	14	F.	Very good	" "	" "	3 cc	1' 25"	1' 10"	120	130	108	18	24	14	Dil.	Ab.	-----	Poor	Slight headache, nausea, vomiting, numbness of extremities.
93	10465	42	F.	-----	" "	" "	6 cc	2' 10"	1'	118	124	106	30	40	28	Dil.	-----	-----	Very good	Slight dizziness.
94	10529	44	F.	-----	" "	" "	Faulty 6 cc	1' 55"	1' 45"	96	120	88	20	26	21	Dil.	-----	-----	Poor	Slight headache, nausea, vomiting, very dizzy, extremities numb.
95	10531	21	F.	Good	" "	" "	3 cc	1' 20"	55"	88	86	68	21	24	18	Dil.	Ab.	Set	Very good	No unpleasant after effects.
96	10152	13	F.	-----	" "	" "	Faulty 6 cc	-----	-----	120	100	124	20	33	28	Dil.	Ab.	Not	Very good	No unpleasant after effects.
97	10154	35	F.	-----	" "	" "	3 cc	1' 32"	50"	82	92	92	20	18	22	Dil.	Ab.	-----	Very good	No unpleasant after effects.
98	10215	45	F.	-----	" "	" "	3 cc	1' 4"	50"	70	104	90	18	26	22	Dil.	Pres.	-----	Fair	Nauseated, weak in extremities.
99	10219	22	F.	-----	" "	" "	Faulty 6 cc	1' 40"	58"	70	106	72	22	21	20	-----	-----	-----	Very good	No unpleasant after effects.
100	10314	17	F.	-----	" "	" "	Faulty 6 cc	55"	1' 40"	72	84	72	20	24	22	-----	-----	-----	Good	Slight headache only.
101	10229	40	F.	-----	" "	" "	3 cc	1' 12"	1' 10"	105	106	84	22	30	20	Dil.	Pres.	-----	Very good	No unpleasant after effects.
102	11031	45	F.	Very good	" "	" "	3 cc	45"	1' 12"	84	88	82	24	36	24	Dil.	Ab.	-----	Fair	Slight headache, numbness of extremities, weak generally.
103	11032	22	F.	-----	" "	Light complete	3 cc	1' 17"	30"	95	104	91	22	30	22	Dil.	Ab.	-----	Good	No unpleasant after effects.
104	11072	19	F.	Good	" "	Deep complete	3 cc	1' 15"	1' 10"	84	95	82	17	19	16	Dil.	Pres.	-----	Good	Slight dizziness.
105	11096	35	F.	-----	" "	" "	3 cc	1' 3"	1'	132	169	102	21	28	22	Dil.	Ab.	-----	Good	Practically no unpleasant symptoms.
106	11105	22	F.	-----	" "	" "	3 cc	1' 5"	-----	89	96	83	18	26	16	Dil.	Pres.	Not	Very good	No unpleasant after effects.
107	11230	79	M.	-----	" "	" "	3 cc	1' 5"	50"	96	84	75	30	30	24	Dil.	Pres.	-----	Very good	No unpleasant after effects.
108	11233	17	F.	-----	" "	" "	3 cc	50"	1' 45"	90	95	106	24	30	21	Dil.	Ab.	-----	Poor	Nausea, vomiting, dizziness, numbness of extremities.
109	11236	40	F.	-----	" "	" "	3 cc	1' 12"	1' 13"	108	95	106	30	20	19	-----	-----	-----	Very good	No unpleasant symptoms.
110	11395	27	F.	-----	" "	Light complete	3 cc	57"	40"	72	82	80	21	40	18	Dil.	Pres.	Not	Good	Numbness of extremities.



Having presented a paper on this subject to you a year ago, it would be indulging on your time to enter again into a discussion of the chemical and physical properties of somnoform; of the methods of administration or of the degrees of anaesthesia. In regard to the degrees of somnoform anaesthesia, it is sufficient to say that we recognize three stages, as we do in most other anaesthetics.

*Sex, Condition, Temperament, Etc.*

Sex and Age.

Number of Male Patients.....	23 or 20.9%
Number of Female Patients...	87 or 79.1%
Oldest Male.....	79 years
Youngest Male.....	8 "
Oldest Female.....	56 "
Youngest Female.....	10 "
Average age of 106 patients...	28.8 years

Of 106 patients seven were over fifty years of age.

In these seven cases the after condition was good with no unpleasant symptoms.

In comparing the sexes we find no noteworthy differences, either in the amount necessary; clinical and physiological actions; time required; length of narcosis or speed or type of recovery. Unpleasant after-effects were distributed practically equally between the two sexes.

Like other anaesthetics, mental and physical condition, temperament, habits, etc., exert their influences on clinical and physiological actions, quantity used, induction, narcosis, recovery and after effects. Generally speaking, with alcoholics and the hysterical type of cases, somnoform anaesthesia is not induced as quickly and pleasantly, nor is the narcosis as lengthy and the after-condition as good as in patients of good physical condition and of a sanguine temperament without fear, bad habits or other depressing contributory causes. In this latter class of cases, also, the recovery is more speedy, with less of a tendency to depression.

Age is always a factor to be considered in the administration of any anaesthetic, but we may administer somnoform with reasonable confidence to patients with no organic disease and with fear allayed.



## QUANTITY.

In four cases it was necessary to use 6 c. c. to induce profound anaesthesia. In all others, 3 c. c. was used, with the exception of ten cases, in which the administration was faulty.

The question of quantity is a very important one, because the danger of somnoform anaesthesia seems to lie in using a large dosage or in attempting continuous anaesthesia. Experiences lead me to believe that dangerous conditions are more apt to arise, even in selected cases, if the anaesthesia is continued longer than the narcosis afforded by a 3 c. c. vial. A number of deaths have been reported from the use of ethyl chloride, when used alone as a general anaesthetic, and at the Rhode Island Hospital in Providence its use has been discontinued, except when asked for by the visiting surgeon.

Realizing the possible dangers of a large dosage and of continuous anaesthesia, and assuming that no combination of drugs is safer than its most dangerous component—60% of somnoform is ethyl chloride and 5% of somnoform is ethyl bromide,—safety demanded that we exercise extreme caution. Therefore, no attempt was made to continue the anaesthesia and keep the patient under it longer than the time afforded by a 3 c. c. capsule. In a few well-selected cases another 3 c. c. vial was given after complete recovery, with the haemorrhage checked. In these patients no unfavorable symptoms were noted.

NOTE—Since this paper was read the per cent. of ingredients of somnoform has been changed and at the present time it is composed of ethyl chloride 83%, methyl chloride 16% and ethyl bromide 1%. Observations and deductions noted in this paper were made under the old formula, which was ethyl chloride 60%, methyl chloride 35% and ethyl bromide 5%.

It is best not to readminister immediately, but to perform further operating on another date unless the case positively demands immediate attention. In a given case, if the operator could foresee that a re-administration might be necessary, his better judgment would advise him to eliminate somnoform entirely and use ether or nitrous oxide with re-administrations, or continuous nitrous oxide anaesthesia with nitrous oxide and air or nitrous oxide and oxygen.

The few cases of continuous anaesthesia that we have attempted with nitrous oxide plus air, or with nitrous oxide plus

air plus oxygen have been attended with very favorable results. However, we would rather have more experience with this form of anaesthesia before expressing a positive opinion as to its safety and value.

The apparatus for maintaining a continuous and definite pressure and the water jacket for preventing freezing of nitrous oxide while it is leaving the cylinder, both of which were devised by Professor Harold Cross of Harvard Dental School, are of especial value and a necessity in administering nitrous oxide continuously.

In most cases 3 c. c. was found to induce profound anaesthesia and an operating narcosis of good length, but some alcoholics required more than this amount. Practical experiences lead us to feel quite confident in saying that a fairly lengthy operating period can be maintained in many cases with a quantity less than 3 c. c. We are unable to confirm this statement at the present time, however, since the smallest amount prepared for the market is in 3 c. c. vials.

#### INDUCTION AND OPERATING NARCOSIS.

Average induction of 99 cases,	58.6 sec.
Average narcosis of 98 cases,	58.91 sec.
Average induction of 9 cases, (somnoform + air)	55.88 sec.
Average narcosis of 9 cases, (somnoform + air)	1 min. 11.3 sec.
Average induction of 90 cases, (somnoform — air)	58.87 sec.
Average narcosis of 89 cases, (somnoform — air)	57.06 sec.
Longest induction (3cc used)	2 min. 5 sec., narcosis 1 min.
Shortest induction (3cc used)	15 sec., narcosis 1 min.
Longest narcosis (3cc used)	2 min. 30 sec., induction 1 min. 10 sec.
*Shortest narcosis (3cc used),	10 sec., induction 1 min. 22 sec.

An analysis of the records of induction and operating narcosis informs us that the latter period is about equal to the former, in length of time, when somnoform is given without air. When somnoform is administered with air the narcosis was fourteen and a fraction seconds longer than the narcosis induced without air. These records also show us that we may expect an

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\* Marked decrease in force of heart during administration.

operating narcosis of about one minute with 3 cc. of somnoform in the average case.

*Cardiac and Respiratory Observations.*

Pulse.

Pulse rate during administration compared with rate before taking anaesthetic:

103 Cases—Rate increased in 72 or 69.9%.

Rate decreased in 25 or 24.27%.

No change in 6 or 5.82%.

In three cases there was an increase in the pulse rate but a marked diminution in force during the administration. In one case there was marked diminution in force with decrease in rate of the pulse.

Pulse rate upon recovery compared with rate before taking anaesthetic:

106 Cases—Rate increased in 25 or 23.58%.

Rate decreased in 72 or 67.92%.

In four cases there was marked diminution in force upon recovery.

RESPIRATION.

Rate during administration compared with rate before:

94 Cases—Rate increased in 64 or 68.08%.

Rate decreased in 21 or 22.34%.

No change in 9 or 9.57%.

Rate upon recovery compared with rate before:

104 Cases—Rate increased in 41 or 39.42%.

Rate decreased in 40 or 38.46%.

No change in 23 or 22.11%.

In studying cardiac and respiratory tabulations we should take into account the fact that the pulse and respiration were no doubt increased in frequency in many cases because of nervous fear before the operation. Therefore, a patient's normal pulse and respiratory rate may have been charted higher in our records than was that patient's normal pulse and respiration. In our comparison, then, of rates before with rates during administration, and also rates before with rates after administration, it naturally follows that we should have a higher per cent. of cases in both our cardiac and respiratory tabulations in which the rate was increased and a correspondingly lower per cent. of cases in which the rate was decreased.

From our observations on the heart beat we may state that the pulse rate was increased during the administration in the vast majority of cases and that it was usually under normal upon recovery.

In regard to respiration we may say that the rate is generally increased during anaesthesia and that, upon recovery, we found about an equal distribution of cases in which the rate was increased and in which it was decreased. The breathing at no time appeared labored except in highly nervous, hysterical patients when it was sometimes spasmodic in character in preliminary anaesthesia. Measured, automatic breathing was typical of complete, deep anaesthesia and in no case did the patient become cyanotic.

#### OBSERVATIONS ON THE EYE.

93 Cases—Pupil dilated in 75 or 80.64%.

Pupil not dilated in 18 or 19.35%.

72 Cases—Corneal Reflex abolished in 43 or 59.72%.

Corneal Reflex present in 29 or 40.27%.

Observations on the eye appear to confirm our deductions of a year ago, i. e., the pupil is usually dilated in the complete, deep stage of anaesthesia.

The corneal reflex was found to be abolished in practically 60% of cases. Therefore, it is not found absent in deep anaesthesia as often as the pupil is found dilated. In light anaesthesia the corneal reflex is more often present.

#### RECOVERY AND AFTER EFFECTS.

##### AFTER CONDITION—91 CASES.

After Condition—Very good	23	25.27%.
Good	51	56.04%.
Fair	7	7.69%.
Poor	9	9.89%.
Very poor	1	1.09%.

An examination of the table of after condition shows us that the patient is in fairly good condition upon recovery in the most of cases.

##### AFTER EFFECTS—99 CASES.

After Effects—Cases with no unpleasant symptoms 58 58.58%.

Cases with unpleasant symptoms 41 41.41%.

The principal unpleasant after effects noted and in the order



of frequency were numbness of extremities, dizziness, headache, nausea, and involuntary micturition—(4 cases in 110).

In 13 cases of the above named 41 the unpleasant after effects were so slight as to be of little or no importance.

Therefore, twenty-eight patients in ninety-nine suffered from after effects which varied in kind and in degree of intensity in different individuals and which were very much more than trifling in character in every one of these twenty-eight cases. Still, it was not necessary to resort to stimulation in any case, since the condition of no patient assumed a dangerous character.

The case tabulated "very poor"—No. 7—suffered from practically the same disagreeable after effects two weeks previously upon recovering from nitrous oxide anaesthesia. Nausea may have been caused in some cases by the swallowing of blood but nausea is not as commonly met with following nitrous oxide even though blood has been swallowed.

In summing up, it seems fair to say that somnoform is not as safe as nitrous oxide nor is it as pleasant to take on account of its pungent odor. Moreover, there is no doubt but that it causes a larger number of unpleasant after effects than nitrous oxide and these unpleasant symptoms appear more frequently. Somnoform also induces a slower recovery with more general depression than nitrous oxide.

It surpasses nitrous oxide by inducing anaesthesia more rapidly and by leaving a more lengthy and excellent operating narcosis, which is free from cyanosis, jactitation, muscular contraction and irregular breathing.

In conclusion we will say that if the dosage is small; if the anaesthesia is not continuous and if it is administered by an experienced man who uses care and sound judgment in the selection of cases who possesses the requisite knowledge of treating dangerous conditions and who has the necessary stimulants always at hand, he may feel reasonably safe in administering somnoform.

WHAT SHALL BE GOOD PRACTICE IN FILLING  
METHODS?\*

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BY WILLIAM B. DUNNING, D. D. S., NEW YORK CITY.

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Even so ancient an authority as King Arthur said: "The old order changeth, yielding place to new"—and the assertion is probably a safe one, that man and his affairs must change forever. Whether he advances or retrogrades, his mutation is as certain as the passage of time. Taking it for granted that upon the whole he is advancing, and shall always progress, still that is but another way of saying that his work can never be perfect.

Such a preamble seems wholesome as well as homely in the discussion of the present topic. The art of filling carious cavities, 1910.

ties in teeth is as old as civilized man, but dental science is still in very callow youth. No apology, therefore, is considered necessary for reviewing this well-worn and always important subject. We may naturally be proud of great progress in recent years, but we are still far from having determined what shall be the standard of procedure in this department of dental surgery.

At the outset it may be well to speak of the great importance, at least for many years to come, of a rational, simplified and effectual system of practice in filling operations. It is not to be denied—and surely devoutly to be hoped—that the day may come when the need of mechanical restoration of lost dental tissue will cease, for the reason that through advanced practices in bodily and oral hygiene, the onset of dental caries will be checked, or at least controlled, from childhood through adult life. But that happy consummation may be long in coming, and meanwhile carious cavities must be dealt with. The present need for successful fillings being therefore quite evident, no one will question the importance of the highest attainable excellence in their construction. It is the purpose of this paper to narrow the subject to the consideration of metal fillings.

The work of our leading operators ten years ago, in the making of gold foil fillings, had reached what seemed to be very

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\*Read before The American Academy of Dental Science, February

near the perfection of technique. A standard of excellence was emerging from that chaos of empirical vagueness which always surrounds the efforts of pioneers. The disjointed teachings of men of strong personalities, and high attainments, had been cleared of all that did not aim at the mark, and the student went directly to his work by methods of proved certainty. The text books were becoming standardized, and the subject seemed to have reached its limits of growth.

At this very time, however, a door was opened, followed by much light from a new direction. The advent of the inlay idea—as applied to porcelain or metal—profoundly upset our hard-earned notions of practice. A sense of security and pride in having arrived at seeming excellence was jostled by this all-too-simple device. It was given the rough treatment a new comer is apt to receive, and its great field of usefulness became the sooner manifest. Dr. Taggart's casting device brought the application of the gold inlay within the scope of daily practice, and it became necessary to re-open the question which has been taken as a text for this paper.

The true value of the inlay, as compared to the foil filling, has been carefully estimated by hundreds of good operators, who have had no other thought but to arrive at the truth. They have set aside the enthusiast, and the conservative, and have proceeded in this new work with open minds. While the balance of opinion is constantly shifting, much definite knowledge of the inlay has been acquired, and an attempt to formulate its place in dental practice appears to be no longer premature. As to the necessity of adjusting one's practice to the requirements of inlay work, there seems to be less doubt with each year of experience.

With due respect to the danger of making a concrete statement, I would briefly say that I believe ninety per cent. of cavities involving more than one surface, which are ordinarily filled with gold foil, may be best filled with gold inlays; that any simple cavity suitable for metal, having a diameter of over four millimeters, should be so filled; and that about half of the cavities now reserved for amalgam should be filled with gold inlays. This means that the cast inlay is to become our prime filling—a rather startling statement to many careful operators.

This deliberate opinion has come only after the cautious use of inlays in my practice for about five years—beginning with the double shell method for extensive cavities only. With the introduction of the cast inlay and improved technique, I have gradually included other classes and sizes of cavities—holding always to the belief that certain fillings can be best made with foil, and that the plugger can never be set aside. But the relative importance of the two methods has become reversed. In the first instance, the inlay was adopted as a useful adjunct to the plugger; at the present time the plugger is important for a restricted class of fillings for which the inlay is not suitable.

Among the cavities that probably should always be filled with foil, may be mentioned:

1. All simple cavities of diameter less than four millimeters. This includes most fissures and many buccal cavities.
2. The unusual and sometimes elaborate cavities in lingual and proximate surfaces of incisors, where gold will be inconspicuous, and where porcelain or a silicate filling would be of doubtful permanence.

The difficulties frequently met under class two are enough to warn the operator against losing his ability to manipulate skilfully gold foil.

Assuming that a large percentage of the cavities we are called upon to fill may now be best cared for by means of the cast inlay method, the question of technique becomes of great importance.

It would seem wise to employ both the "direct method" and the "impression method" in the making of the wax core. The former, which consists of forming the wax in the actual cavity, removing, attaching to the sprue and casting, has the advantage of simplicity, and hence less likelihood of error through inaccuracy in the mechanical steps necessary to make the inlay. It is especially adapted to simple and accessible cavities, where the operator may easily secure the perfect fit and finish of the wax. Under such conditions a great deal of time may be well saved.

The impression method has many advantages where the cavity is large and complicated. An accurate impression of the cavity is taken in modelling compound and a bite of base-plate wax, which latter will sharply define the contact point of the adjoining tooth and the cusps of the occluding teeth.



The difficulty which is usually found in taking an impression of the proximate part of the cavity, owing to the material becoming locked into the interproximate space, may be overcome by means of a simple device. A thin strip of matrix metal, long enough to extend beyond the cavity buccally and lingually, and wide enough to reach from the gum to just beyond the contact point of the adjoining tooth, is placed lightly against the cavity, and so held with a pellet of cotton. A piece of modelling compound (without tray or carrying instrument) is warmed at one end, and worked to a suitable point, leaving most of the compound cold. This point, followed by the pad of colder material, may be easily forced to all parts of the cavity. Upon chilling and removal, the matrix comes away with the impression, and it will be found that the metal has aided in guiding and confining the compound, and thus securing sharp margins in that difficult region.

The impression is surrounded or walled in with plaster, leaving an opening sufficiently large to pack amalgam, and so to make a model of the cavity and tooth. After thorough crystallization this model is removed and trimmed, when it should accurately fit its place in the wax bite; and with it so adjusted, the bite is run in plaster on a small articulator. The wax is removed, and the operator has the amalgam model correctly articulated with the opposing tooth, and correctly placed with regard to the adjoining tooth or teeth. The articulator should be hinged laterally to imitate the trituration of the opposing teeth. With these guides, it is a simple matter to make a wax core ideally correct, and to finish its margins and surface to such a degree that very little finishing will be required in the gold casting.

With a well-trained laboratory assistant, this work can be carried to such excellence that, being given a sharp impression and bite, he returns to the operator the finished inlay, correct in occlusion and approximate contact, and practically ready to be set. In the application to daily practice of this beautifully complete method of inlay formation, I am indebted for suggestions to Dr. Henry W. Gillett, of New York.

Nearly all gold inlays should be hollowed out, for in this way we insure considerable thickness of cement over the pulpal wall, excellent retention of the inlay, comparative ease of drilling

through in case of trouble, and lastly, avoid unnecessary use of metal. With a solid inlay, the under surface may be well roughened to receive the cement by going over it with a sharp plugger, run in the rapid mallet.

It has been my pleasure recently to have a number of cases, involving two gold inlays which were to fill adjoining cavities, come to me from the laboratory so perfectly formed, fitted, and finished, that upon their dropping into their places I could find nothing further to do in the way of adjustment; and so simply removed, and set them. Of course, where there is any fault in technique, much time may be lost in adjusting an inlay, but where all goes well this method seems to be almost as near the ideal in the matter of mechanical restoration as we may hope to find.

There has been a great deal of criticism of the inlay, based on the fact that wider cutting is generally necessary in the correct formation of the cavity. While there is no denying the fact that this wider cutting may easily be carried to an unwarranted and undesirable extent, still two considerations should be borne in mind:

1. It is very often possible to avoid undue cutting by many little devices which suggest themselves at the time. Thus a large occlusal cavity which the process of decay has undercut to such extent that great sacrifice would be necessary in forming margins, may easily be "shored up," so to speak, with cement, and so formed correctly for the removal of the core or impression. In the case of a mesio-occlusal cavity in a molar, the gingival margin of which has been much extended, a temporary core of cement or gutta percha may be built under the cusps at the bucco-gingival and linguo-gingival angles, which may be trimmed to conform with the width of the cavity between the cusps. In this way the cusps are preserved, and, after the inlay is set, the cores are removed, the lingual cavity perhaps filled with amalgam, the buccal with gold foil, or if large, a secondary inlay. A silicate cement filling may serve well if that part of the cavity is conspicuous. It is further quite practicable to make two or more inlays, for a complicated restoration.

2. In all probability the careful operators in the past have been rather too conservative of marginal ridges, weak cusps,

and frail enamel walls. This has been shown in numberless cases where the operator has with much toil and patience succeeded in making a perfect gold filling under a doubtful marginal ridge, which latter has in the course of a couple of years simply broken away, leaving his beautiful operation to become undermined. If he had anticipated that disaster by freely removing all doubtful enamel, he would have placed a far more permanent filling. Now the use of the gold inlay is teaching us, perforce, to remove these doubtful portions of tooth structure, and from the necessity of the work we are conceiving new and more rational ideas as to cavity formation.

While I by no means wish to give the impression that we should be incautious in the cutting away of cavity walls, still it seems that we are often shackled by the fear of disturbing what nature has put there. The plea of reverence for tooth structure is as commendable as any other rule of self-evident wisdom, but if carried too far, it becomes merely a pious notion, and a cloak for many sins of omission. The operator should consider well the probable value of a certain wall or cusp, and when in doubt, be thorough with the chisel.

In this short paper I have dealt with the subject of filling operations in the radical sense; that is to say, I have not considered the repair of fillings or such temporizing operations as we are frequently called upon to perform for persons in weak nervous, or physical condition, or where for other reasons such procedure seems wise. In our over-rushed age I think we are a little inclined to over-do this sort of treatment for many patients, for the reason that the patient and the operator rather dread radical operations. Now as a matter of fact, the amount of dental work to be done in each community is so far beyond what can ever be accomplished, it would seem well for the operator to attempt wherever possible to place the seal of permanence upon his work; and just here the gold inlay enables him to render such service without great expenditure of time, or without undue nervous strain upon himself or the patient. This seems to be one of the most hopeful features of inlay work, that we may easily and expeditiously place excellent and permanent fillings, and so do away with much of the dread that has always attended such undertakings.

I fully expect to be criticized for not giving space to the consideration of the many excellences of the perfectly built and finished gold foil filling, minutely compared with those of the gold inlay. This omission has not been due to any lack of veneration for what has stood, so long unchallenged, as our classical operation. Neither have I purposely slighted the trustworthy amalgam. But it is taken for granted that these topics have been so long sifted by every member of this audience, that they need not be re-catalogued here. The immediate purpose has been to emphasize the growing usefulness of the gold inlay in the light of what is already known.

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## THE LOCAL AND VACCINE TREATMENT OF PYORRHEA ALVEOLARIS.\*

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BY ARTHUR H. MERRITT, D. D. S., NEW YORK.

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Before considering the treatment of pyorrhea alveolaris with bacterial vaccines, it will be necessary to review briefly the role played by bacteria in disease, and the manner in which the body protects itself against infection. For, while it is highly improbable that in pyorrhea we are dealing with an infection caused by a specific organism, we are nevertheless dealing with a chronic localized infection in which bacteria play no unimportant part.

The body has at its command various mechanisms with which to cope with bacterial invasion, the same being called into play upon all such occasions. Should the means at its disposal be sufficient, the forces of infection are routed; should they be insufficient or ill-directed, suppurative inflammation will ensue, with a tendency to become chronic. Most prominent among these protective forces are opsonins, which possess the power of sensitizing the leucocytes, and upon which their phagocytic activity depends. These bodies, about which little is known, are believed to be the results of muscular activity, and are of local formation.

Any condition which interferes with their formation will necessarily lower the bacteriotropic pressure of that part and predispose to bacterial infection. Wright has himself expressed the

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\*Read before The New York Institute of Stomatology, December 7, 1909.



belief that bacterial invasion occurs only in regions of lowered bacteriotropic pressure, i. e., in regions where the anti-bacterial substances are altogether absent or, considerably reduced in amount. In fact it has been repeatedly shown that a low index is the rule in chronic localized infections; in other words, that a low bacteria devouring power of the leucocytes and infection go hand in hand. To overcome this condition by stimulating the production of opsonins is the principle upon which vaccine therapy rests. It differs from vaccination (which is directed toward the prevention of infection) in that it is employed for the purpose of affecting a cure in persons who are already the victims of infection. It differs also from the so-called antitoxin treatment, which has for its purpose the neutralizing of poisons liberated in the body through bacterial activity. In short, the one aim in the use of opsonotherapy is the stimulation of the phagocytic activity of the leucocyte through the production of opsonins. Infection having taken place, bacteria, preferably from the patient's own lesion, are obtained, and grown on an appropriate medium, their nature being determined by microscopical examination. To determine the opsonic index in any given case, the bacteria devouring power of the patient's leucocytes is compared with that of a normal person, the test being made with bacteria of the same nature as those which characterize the infection. The technique by which this is obtained is more or less involved, and may be dispensed with in localized infections, dependence being placed upon clinical symptoms alone, though it is always interesting, and a valuable aid to treatment.

Bacteria so obtained, having been killed are suspended in a nutrient broth or normal salt solution and constitutes what is termed an antogenous vaccine, differing from a stock vaccine in that it is prepared from cultures taken from the patient's own lesion. The number employed in each inoculum will depend largely upon the opsonic index of the patient and the nature of the infecting organism.

It is always better to err on the side of too small rather than on that of too large dosage. The inoculation is not infrequently followed by a lowering of the index and a coincident exaggeration of the disease symptoms. This is known as the negative phase. If the dose has been properly estimated, this

will be followed by a rise of the index which will probably carry it several points above normal, where it will remain with slight variation for several days. This is spoken of as the positive phase. These inoculations are repeated with sufficient frequency to maintain an increased index during the period of treatment. The result is an increase in the phagocytic activity of the leucocytes dependent upon an increase in the opsonic power of the blood fluids, and is usually attended with marked improvement in the disease.

In the application of this principle to the treatment of pyorrhea alveolaris, it is too much to expect from it the same results as would obtain in those cases in which bacteria are the sole etiologic factors.

Pyorrhea is not caused by a specific organism. Nor can we regard those found in pyorrheal pus in any other light than as being one of several etiologic factors, and the chief agents in its chronicity. That they are, however, factors to be dealt with in its treatment, would seem proven by the fact that in a vast majority of those cases in which the index has been taken, it has been shown to be sub-normal to the organisms found, and that as a result of their administration in the form of vaccines, there has been marked improvement in the subjective symptoms, independent of local treatment. Knowing as we do that the employment of a vaccine the organisms of which sustain no casual relation to the infection, would have no affect whatever upon the course of the disease, we are justified in concluding that in pyorrhea alveolaris the organisms are factors in its causation. It is not to be understood that the indiscriminate use of bacterial vaccines in pyorrhea is advocated. There are many cases presenting for treatment which are obviously the result of neglect, requiring only thorough local treatment and careful attention to oral hygiene to affect a cure.

There are others again where, in spite of every care on the part of the patient, pyorrhea develops, and that frequently in patients comparatively young. Such cases usually reveal a family history of pyorrhea, and go far toward substantiating what is now believed by many to be a fact, that in certain individuals there is present an acquired or inherited inability to elaborate the protective substances of the blood. As a consequence, such individuals are peculiarly susceptible to certain forms of infection,

which having once established themselves tend to become chronic, resisting the more ordinary forms of treatment.

It is in such cases of pyorrhea that vaccines may prove to be of value as supplemental to local treatment. One thing, however, which cannot be too strongly emphasized is the necessity in all cases of the most thorough local treatment, by which is meant curettement, massage, cleanliness, and where teeth are loose, splinting. The use of vaccines is directed toward the raising of the patient's resistance to infection, and while as a result of such treatment there will be a considerable improvement in the local condition and a more or less complete disappearance of subjective symptoms, permanently good results can never be expected by this means alone.

My own treatment of such cases has been as follows:—A culture is obtained from the pyorrhœal discharge and grown on an artificial medium. From this the vaccine is prepared. In this part of the work I have had the co-operation and loyal support of Dr. William R. Williams, of this city, for whose services I make grateful acknowledgement. Injections are made about once each week, the numbers of organisms injected being gradually increased with each dose.

It has been my experience in the limited number of cases in which I have employed it that after a month of such treatment the patient will report as being much improved; the teeth will be found to be firmer, less sensitive to thermal shock, less painful to pressure; in fact, from the patient's point of view the cure seems complete. It is at this point and under these favorable conditions that local treatment is commenced. The gums about the teeth to be operated upon are cocoainized, limiting the treatment to the number of teeth which can be completed within the time reserved, the purpose being to so completely remove the concretions upon such roots as to make further curettement unnecessary.

It is right here that many operators fail, and I believe they do so, not as has been asserted, because the technique is so difficult that few possess the ability to acquire it, but because the pain which accompanies treatment in advanced cases is such that the operator spares the patient and spoils the operation. It is my practice to employ in all cases where the pockets are of any considerable depth, a one-half of one per cent. solution of cocaine,

which produces a complete anaesthesia lasting sufficiently long to permit of the most extended operation of this nature. This makes curettement possible without the infliction of pain, and insures the removal of deposits and necrotic tissue more thoroughly than would otherwise be possible.

Having completed the curettement and syringed out the pockets to free them of loose scales, a few drops of the bifluoride of ammonium devised by Dr. Joseph Head, of Philadelphia, is injected into their depths. Each affected tooth is treated in like manner until all have come under treatment, the vaccine being employed meanwhile. If it be found that those treated at a previous visit show signs of pus, they are again examined for scales and the bifluoride of ammonium is again injected. As a result of such treatment, I have obtained in the few cases in which I have employed it very satisfactory results. The teeth become markedly firmer, the discharge of pus ceased, and the patients themselves were free from their previous painful symptoms.

It has been urged that the use of vaccines in the treatment of pyorrhea is unnecessary, that local treatment alone will suffice to affect a cure in any case where a cure can be reasonably expected. With the advocates of this theory I have no contention. It is not my purpose at this time to make any claims whatever for the value of vaccines in pyorrhea. I desire simply to report my experience in their use, realizing full well that if further experiments should prove that they have no place in its treatment, that fact will prevail, despite any thing which I may say to the contrary.

On the other hand, if it be found that a local or general deficiency of opsonins predisposes to pyorrheal infection, the employment of vaccines for overcoming such predisposition will take its place among the recognized modes of treatment in spite of adverse criticism. It is my personal belief, however, that vaccine therapy will never play a large part in the treatment of pyorrhea. The technique involved is too elaborate, and there are too many other etiologic factors to be considered in its treatment. And yet, the application of bacterial vaccines to the treatment of pyorrhea I believe to be a perfectly rational one. When we consider first, that the more localized is the infection, the more favorable are the conditions for opsonic treatment; second, that a deficiency in the protective substance of the blood may be local



only, the same being dependent upon circulatory disturbances, and that such condition will of itself suffice to determine infection; third, that in a large per cent. of those cases of pyorrhea in which the index has been taken it has been found to be subnormal; and lastly that the employment in such cases of an antogenous vaccine has been followed by marked improvement in the subjective symptoms, thereby establishing the causal relations of such organisms—it is when we consider these factors in their relation to pyorrhea that we are led to believe that in not few instances it is dependent upon other than purely local conditions, and that successful treatment, while insisting upon the most careful attention to local causes, is equally insistent that attention be given to predisposing causes of a systemic nature. Whether cases so treated are permanently cured is a question which cannot at this time be answered. Only time will tell. It would seem not unreasonable to expect that with thorough local treatment, supplemented by an increased resistance to infection brought about through the use of bacterial vaccines, that the possibilities of recurrence would be reduced with the result that the prognosis is better than could be expected were one to limit himself to either the local or vaccine treatments.

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### THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, October 5, 1909, at the Academy of Medicine, New York City. The President, Dr. J. Morgan Howe, occupied the chair, and called the meeting to order, welcoming the members after the summer vacation. The Secretary read the minutes of the last regular meeting, which were approved.

#### COMMUNICATIONS ON THEORY AND PRACTICE.

*Dr. C. M. Master*—Having been particularly unfortunate with fractures of the porcelain inlay corners, I thought out a little device the presentation of which may be of interest. It is simply a cast gold corner composed of gold clasp metal, the face of which is cut out to form a sort of box to retain a porcelain inlay. The gold corner is cemented into place and the porcelain inserted in the gold box in the usual way. The cast gold corner serves to protect the porcelain from fracture on its lingual surface and tip. A low fusing body of porcelain may be used. The

preparation of the cavity will have to be modified according to the shape of the tooth and the position of the pulp. I always insert a platinum and irridium pin by making a pit in the tooth to hold the same. This pin becomes part of the gold corner when cast. Always try to have a groove on the lingual surface to serve as an undercut. One of my patients with an extremely bad bite has had a corner put on after this method and finds it very satisfactory, the inlay having been in for one year.

*The President*—Is that intended only for building out corners of teeth?

*Dr. Master*—Yes. Of course an enamel filling could be put in in place of porcelain, if so desired; and I have done so.

The President then introduced the essayist of the evening, Dr. John Oppie McCall, of Binghamton, N. Y., who read a paper on the subject, "On a Chair of Dental Science in the Medical Schools."

*Dr. McCall*—It is naturally with a great deal of pleasure that I speak to-night. I would say, by way of preface, that when I began to write this paper I found that if I were going to treat the subject at all adequately I should make the paper of such length that it would be extremely wearisome; so I have confined myself to an effort to bring out the main point without going into the details of the various minor points which lead up to the subject.

(For Dr. McCall's paper see page 5.) ,

#### DISCUSSION OF DR. M'CALL'S PAPER.

*The President*—Gentlemen, we have been fortunate to hear this ably presented argument. I have no doubt it has carried conviction to most of our minds. The question is, what effect will it have upon the minds of medical men. We are fortunate to-night in having with us two well-known representatives of the medical profession, who have consented to discuss this paper. I have the pleasure of introducing Dr. Fairbairn, of Brooklyn, who will speak first on the subject.

*Dr. H. A. Fairbairn*—This is not a new subject to me. I am connected with a medical school, and for some years we have been discussing the feasibility of introducing a course of dentistry. We have recognized the necessity of it, but have not seen our way clear, both from lack of funds and of time. Still further have I

been brought into close touch with this question in my hospital experience. In the Brooklyn Hospital, and also in the Long Island College Hospital, we appointed a dentist on the staff, who makes his rounds and performs his work, or advises with the surgeon, so you see I am very much in the initiatory position of the plea that Dr. McCall makes. Dr. McCall touches only on the borderland, as he says; it is impossible to go into such a subject fully, because it certainly is a great question. To the diagnostician the subject opens up a much broader field, and one is amazed at times at either the lack of knowledge or the neglect shown by the practitioners of medicine.

Dr. McCall bases his advocacy for the establishment of a chair of dentistry in the medical college on the ground that it is a branch of medical practice. I agree with him, in so far as the science and philosophy of the subject are concerned. Their bearing on general disease is such that the diagnostician and therapist must study them carefully. As to the mechanical and artistic part, it would be out of the question to require mastery of this, as the practitioner would not use them, except in surgical procedure.

Examination of the mouth may reveal two things—either foci as the basis of general trouble, or serious lesions resulting from general systemic disturbance. These foci cannot be recognized nor appreciated without thorough instruction by competent teachers. Some of our large hospitals have members of the dental profession on their attending and consulting staffs. The regular practicing physician ought to have sufficient knowledge of the subject to know when to apply for the aid of a dentist.

How to meet this condition is a subject for the colleges to consider. Medical students cannot be required to take a full course in dentistry. It is a problem how they are to be instructed in the branches of pathology and diagnosis.

I do not think the doctor dwelt sufficiently on the value of the interdental splint. In our hospitals I have been greatly impressed with its artistic value, and that alone is sufficient to introduce the dentist in the hospital. The old style of fixing up broken jaws was simply indescribable.

It is rather mortifying to find occasionally in the hospital a patient who has undergone all sorts of treatment for intestinal and gastric troubles—running a temperature, without having the

cause of the trouble discovered—to find finally that the absence of sufficient teeth and their bad quality is the cause of it. Simply the failure to examine the mouth explains the situation.

That occurred to one of our most distinguished surgeons in Baltimore. He had rheumatic trouble. The dental surgeon discovered a certain condition at the roots of the teeth. His teeth were scaled and made normal, and his rheumatism disappeared. It is claimed usually that the pus bug or the rheumatic bug gets through the tonsil, but this doctor was cured by the dental surgeon.

The Swedish doctors have investigated the bearing of this condition of gums and teeth on pernicious anaemia, as they call it. Although they could not point that out as the cause, they proved it to be a factor.

It may be said, ought not the dentist to be educated along the same lines exactly as the physician, leading up to his profession—that it ought to work both ways. That is hardly required. The dentist does not need an intimate knowledge of general pathology, but our professions do so interlace that a partial knowledge of general pathology ought to be possessed by the dentist, and I am sure we will work together very heartily and very effectively.

*Dr. J. G. Greeff*—I am almost afraid to speak after what my silver-tongued friend, Dr. Fairbairn, has said, because I am not able to express myself as well as he, nor am I as much in favor of the idea under discussion. Every one, however, is entitled to an opinion, and if it is an honest one he should be permitted to proclaim it, and to do so regardless of whether it will please or not.

A good deal can be said for and against the idea as put forth in this interesting paper, and I agree with the writer on some points, but not on all. As far as the lack of knowledge on the part of the medical student in diseases of the teeth and parts of the mouth pertaining to the dental specialty goes, the writer is absolutely correct; but it is not due to a deficiency in teaching. It lies rather with the underestimation of its importance.

Now, it does not seem necessary to establish a chair of dental science in a medical college, to teach the value of a thorough understanding of this specialty and the relations that exist between it and general medicine. The importance of it should be pointed out to those in control of the medical schools. This can



be done by men in your profession through their writings, just as this paper would do were it read as widely as it deserves.

Look upon the question from this point of view. A physician who holds a chair in any one specialty in a medical college, and teaches and practices that alone, has nevertheless been obliged to go through the same course of training in all subjects and branches as every other man who wants his degree of M. D. If he wants to attain a high standing among others, he must devote still more years to general medicine at a hospital, and then only can he devote himself exclusively to his specialty. This requires many years—at least six. If this is the case in any one branch of medicine, should it not be so also in that of dentistry?

I fear that we of the medical profession are somewhat unjustly judged, for surely many of us are aware of the importance that conditions of the mouth take in their relation to many diseases. This of course is especially so in diseases of the digestive tract.

It has been my custom, when confronted with a case of faulty metabolism or disease of the gastro-intestinal tract, to inquire into the condition of the teeth. One of my first questions is towards that end, and if I suspect or find any disease of the teeth, I make it imperative to have them attended to at once. We know how important it is to have the food sufficiently comminuted and mingled with the saliva in the mouth, and also how deleterious it is to have infectious material enter the digestive tract. This, however, is only the case where abscesses discharging pus exist, for the gastric secretions possess bacteriocidal elements which are able to cope with any than very concentrated amounts.

As I said before, I agree with the writer in every point as to the relations of diseases of the mouth and teeth have to those of the general system, and on various organs in special, and feel that we should pay a great deal more attention to them than heretofore. What I do not see is the necessity of imparting this knowledge by the establishment of a chair of dental science in medical schools. There may be a way in which the knowledge which the writer deems so necessary—and I agree with him it is important—can be imparted to the student of medicine. That would be to let the student of medicine attend a certain number of lectures in the dental college, and make that course part of his curriculum, and have questions for examination submitted. Whether this knowledge, which, after all, can be only of a superficial nature,

will benefit the public, or whether it will be a case of where little knowledge will be worse than none, time and experience only can tell.

I feel that I may have expressed myself strongly, but I beg to assure the writer that it is not from any disrespect for his profession.

*The President*—It is only differences of opinion that cause us to think and to thresh out the truth from contributions of this kind. We are very much obliged to these brethren of the medical profession for their thought on this subject. Now we want to hear expression from some of the dental practitioners present.

*Dr. Fairbairn*—I think it would be quite interesting if one of the gentlemen should tell us what branches students are instructed in in the dental colleges that have a bearing on general pathology.

*The President*—Will Dr. Swift tell us something about the courses in the college in which he is professor?

*Dr. A. L. Swift*—That branch is not in my department, and I do not know as much about it as I should, having only been connected with the faculty for a short time, and I have been pretty busy taking care of my own part, operative dentistry. I know, however, that we have a very thorough course. In general pathology we have as instructors medical men who are in every-day practice, and our students are given a very thorough course in that branch. A man who comes out of our college should have a very clear knowledge of general pathology, general anatomy and physiology. It is a three years' course, and as the same facts are driven through at each session, they should have a very decent knowledge of general pathology and bacteriology. They get some histology as well.

*Dr. C. M. Dunne*—I would like to tell the two medical brethren about the course at the University of Pennsylvania, and the only difference existing between the medical and dental courses. In anatomy and physiology the dental and medical students went to the same lectures and quizzes; they took the same course in embryology, histology, and osteology, and were examined by the same men. We had Professor Birdsall, whom probably both of those gentlemen know, for anatomy and histology, and Professor Abbott for bacteriology. We had the same number of lectures and the same lectures that the medical men had, outside of materia medica. The materia medica instruction was different, and

our course of pathology was not quite as thorough. We had a different examination, but I do not believe the examination for dental students in either physiology or anatomy was an easier examination than the one given the students of general medicine. Professor Birdsall was always very good in examining us more about the head than perhaps the other parts of the body, but any man knows that if he has the anatomy from the shoulders up, he has quite a lot.

There is no doubt about the need of physicians knowing more about the mouth and the teeth, but I do not know that it is necessary to have a chair of dental hygiene. I have never seen one person absolutely healthy who had pyorrhea, and I have seen patients treated for stomach trouble whose ailment was caused by the condition of their teeth. I saw one case where every tooth in the man's mouth was loose, and every socket discharging pus. The man had been home with cramps in his stomach, and it was nothing but a condition of the mouth.

The physicians who practice in the smaller cities, who do not have the facilities for everything that those in larger cities have, should know more about dentistry than they do. The majority of the medical men seem to have a dislike for anything that pertains to dentistry, and it is something that should receive more attention by them.

*Dr. Master*—Last Sunday I had as a guest one of the lecturers of the Polyclinic School, and during the course of conversation, while things were a little dull, this physician picked up Angle's book on orthodontia. After that he said nothing to me for almost an hour; then his remark was, "Master, this is an intensely interesting book." I told him that was of great assistance in correcting malformations of the face. He asked to take the book home, and has it now in his possession, so there are some things in dentistry interesting to our brothers who are in the general practice of medicine.

*Dr. H. L. Wheeler*—Dr. Brennan, of the Board of Directors of Bellevue Hospital, was asked to be present to-night, but was unable to come. He has been asking questions of men connected with Bellevue and New York University, and he reported to me that the general opinion seemed to be that while an increased knowledge of conditions—especially pathological conditions—in the mouth seemed desirable, the courses were already so crowded

that the medical men as a whole would be likely to oppose a movement to increase the curriculum by the addition of another course.

From my personal experience with physicians, I believe a large majority of them are awake to the necessity of understanding mouth pathology, and they are deeply interested in its relation to the general system; but they give their dental confreres the credit of understanding the situation, and as a usual thing are more than glad to turn those cases over to the dentist. In Bellevue Hospital, where we have been running for six or seven months a dental department with sixteen or eighteen men on the staff, the physicians gladly turn over all cases in which the teeth are concerned to that department. Fractures and minor surgical cases are also attended to by the dentists there, especially by Dr. Harry Dunning and Dr. Delaney, who are taking the medical course and are particularly interested in that work.

The suggestion made by one of the gentlemen, that dentistry as a specialty should be required to have a six-year course, it seems to me is not practicable at the present time. Examinations of the teeth of school children in this country and others have demonstrated that there are not dentists enough to attend to the pressing needs of the people. In some countries, in Italy and England, for instance, while the dentists are quarreling among themselves as to what constitutes respectability, and whether they should acquire certain degrees, the teeth of the people are so bad that the necessary men for the army and navy cannot be secured, and the authorities are greatly wrought up about it.

It is the same in Germany—only they are not quarreling, but going at it practically, and there are clinics there where men are paid for attending to the teeth of school children who cannot pay for the treatment themselves. I think with anatomy, physiology, bacteriology, histology and a good understanding of materia medica and general pathology, the dentist is quite well equipped to go on with his work. A few of the best men we have have never had either a medical or dental college course—not that I approve of that, but it shows what can be done. Many of our best men attended dental schools when there were two terms of six months—in fact, some of the men received theirs in absentia.

In these days a man should receive the fundamentals and



then give his attention to the pressing needs of his particular branch.

*Dr. McCall*—I need hardly say I am very glad that there has been a difference of opinion in regard to this subject. None of us get the true value of any discussion unless we encounter some opposition. While I have enjoyed having the medical men agree with me, and my dental brethren, too, I have also been pleased to find that they disagree with me on some points, and I will speak of those points in closing the discussion.

It is impossible in treating a subject of this kind to get away from the medical training of the dentist. I purposely said I could not consider that subject in my paper, because there was so much that should be brought into it that I found it necessary to cut out everything that could be omitted.

I think it will be found on investigation that the dental schools of the present day are giving very good courses in general anatomy, physiology, pathology and bacteriology. I have just taken up the work of teaching chemistry in the Dental Department of the University of Buffalo, and while I am not qualified to say just what the courses in other branches are, yet I know that the professor of pathology is giving a course in general pathology which is modeled as nearly as possible on that given in the medical schools. He is a very thorough man, and I am sure if any member of the medical profession were to go into that dental school, or to talk with Dr. Waugh, he would find the course satisfactory as regards meeting the requirements of a specialist of the medical profession. The same is true, I believe, of the bacteriological work. The histology is centered a little more prominently on the histology of the teeth. The teeth are studied with a great deal of care, and while the other tissues of the body perhaps do not receive the attention they do in the medical schools, the various types of tissue in the body are studied and investigated under the microscope.

The statement that the medical student underestimates the value of the dental teaching which is given him, is susceptible of two interpretations. The medical man who gives instruction in regard to the teeth in a medical school is possibly not emphasizing the importance of that subject quite as much as some of the other men emphasize the importance of what they are teaching,

and that may perhaps account for the lack of attention given by the student.

The instructor who gives lectures on a special subject in the medical school is a medical man of general training. He has gone through the special course before he has begun to teach that specialty. The man who teaches the medical students the facts in regard to the teeth and mouth I believe has not had the special training that the oculist, for instance, has had; and while his general training may be excellent, he is not in a position to teach dental science in the way that I, as a dentist, feel it should be taught.

The subject of the advanced physicians has been spoken of and covered well. There are many physicians who take mouth conditions into consideration in their practice, but, as has been said, there are a great many who do not do so. I know of medical men who have paid special attention to the mouth, who claim to have studied it more than the general medical man, who have yet made statements to me in regard to the mouth at which I could hardly help smiling. I do not want to say that in a disparaging way. They have simply not been able to acquire knowledge in regard to the mouth that any dentist has—even if he be not as advanced as we wish all dentists were. Dentists are, of course, often in error. We are not as advanced as we ought to be, but at the same time the fact remains that the physician is taking charge of the entire body. His patient comes to him, and he must know the conditions in the body which may bear on the case in question. That is my contention—that the medical man should receive adequate dental instruction.

In regard to the amount of time already taken up in the medical school, that is a very serious objection. I do not believe in lengthening the course of medical instruction, if it can be avoided. It takes long enough now to attain the degree of M. D.; but I believe that the medical man should attain a well-grounded knowledge of the body, the conditions obtaining therein, and the deviations from normal; and in acquiring that knowledge, the *important* points should be given him. Instruction in regard to dental science should be given to the medical man, even if it were necessary to curtail some of his other work. I may be opposed in that by medical men, but I have been thinking this subject over for some years. This paper is not the result of one or two months'

work. It is a subject that lies very near my heart, and I have given it attention ever since I graduated from dental school. I believe the medical man should have instruction in regard to the mouth, because it is of an importance that demands that instruction.

It remains for me simply to thank both of the physicians who came here to-night to discuss the paper, and all my hearers who were kind enough to receive it so courteously.

*The President*—I take pleasure in expressing the thanks of the Institute to Dr. McCall, and to Drs. Fairbairn and Greeff, for their kindness in presenting this subject to us, and discussing it so ably.

Adjournment.

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## THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Friday evening, November 5th, 1909, at the Academy of Medicine, No. 17 West Forty-third Street.

The vice-president, Dr. S. H. McNaughton, occupied the chair.

*Dr. Wheeler*—The Executive Committee regrets that Dr. Stiff, our essayist, will not be here to-night. I received a telegram this morning stating that, owing to the illness of his wife, he could not come.

### COMMUNICATIONS ON THEORY AND PRACTICE.

*Dr. Karl C. Smith*—I wish to show an easy and effective method for making and adjusting a matrix for gold or plastic fillings. The salient features of this matrix, which I use almost exclusively, are the material and the method of attachment, the object being to produce a matrix that may be drawn close to the gingival margin and at the same time have it sufficiently lax at the knuckling portion of a compound cavity, so the space between the teeth may be perfectly filled, and the filling properly shaped.

I use two materials, steel and German silver, of two thicknesses. The steel is very thin. It is 1-1500 of an inch thick by measurement, and will pass between any teeth. The whole thing is very simple, and needs but to be passed around to be

understood. It is particularly adapted, of course, for plastic fillings, but I use it with gold fillings as well.

Here, too, are samples of the material, both the steel and the German silver, and a model with two matrices in place. They are drawn very tight at the gingival margin and the silk with which they are threaded should be wrapped once, twice or thrice around the tooth as far down as seems desirable for the case at hand. The adjustment of these matrices is as follows: A piece of steel is cut suitable to the case and a hole punched in each end close to what will be the gingival border. A piece of floss about eighteen inches long is passed through the hole in one end, drawn across the matrix and through the other hole. Take a knife, or the end of an instrument, and test them; you will find them quite satisfactory. The matrix should then be passed between the teeth, passing both ends of the silk two or three times in opposite directions around the tooth to be filled, and tightly tied. On account of the tendency of the ligature to seek the smallest circumference when tightly tied, this procedure pulls the edge of the matrix below the gingival margin and makes it very tight at that point. The rest of the matrix may be wrapped with silk, little or much, according to the varying circumstances of the case. This method used with the exceedingly thin steel, makes a very good gingival margin, and allows a sufficient knuckling of the filling with practically no weighing. The distance of the holes from the gingival border of the matrix is important, and of course, should be according to the case in hand.

Punching the steel is somewhat difficult, but a good punch may be made by grinding the end of an old instrument square and hammering the steel with it on a copper cent on an anvil, and using the instrument with a hammer. The steel is very hard to cut smoothly with a rubber dam punch, which I use for the German silver. I have not been able to get steel as thin as this here, but have imported this through my clock repairer.

*Dr. C. O. Kimball*—I wish to say that the steel can be gotten here from Baker. I get it one, two or three-thousandths of an inch thick. The steel is admirable for a matrix, because it is not acted upon by the mercury in the amalgam. A pair of pliers will give it contour in spite of its stiffness, and the result is a matrix which does not corrode, and which will stand any strain.



*Dr. S. E. Davenport*—I would like to call attention to one use of Dr. Karl Smith's matrix, which no doubt has helped many of us out of a scrape. In cases where the cavity extends quite a little under the gum, the matrix is applied first, and then the rubber dam. The rubber does not need then to be crowded below the margin of the cavity, making it easier for the dentist, and a bit more comfortable for the patient.

*Dr. Kimball*—I wish to thank Dr. Smith for bringing this here. The device, as he uses it, is to a certain extent new to me. It seems to be an excellent arrangement, and the punching of holes on a copper disc is certainly a very clever way of getting over the difficulty.

*Dr. Smith*—I do not claim any priority at all for this matrix. The whole thing was shown to me years ago by Dr. Scofield, I think, or it might have been Dr. Frank Wardwell. At any rate, both Dr. Wardwell and Dr. Scofield used it, and probably somebody before them.

*Dr. E. A. Bogue*—That steel has another great value which one of our members in Switzerland utilized. I refer to Dr. Bryan. He made bands of it, which could be put around badly broken teeth as matrices. I was particularly thankful I had those bands to-day, inasmuch as the entire buccal side of a molar was broken off, leaving the lingual side standing, and I had to get under the gum to put that tooth in order. I will put a steel band around the tooth and fasten it, filling it in with amalgam, and malleting it in. I will leave the steel band in place until the filling is solid, and then cut it off and polish down. The bands are soldered with soft solder.

*Dr. Kimball*—I also make those steel bands and usually solder them with silver solder if they are to be used to support amalgam. For flux I use borax wet with alcohol, which will dissolve the grease and permits the borax to take hold, although it is not very easy even then to flow silver solder over the steel. The mercury does attack the soft solder, but the silver solder resists the attack. I have used the same material in a thicker steel, cutting out little discs to fit the necks of the steel at the edge of the gum, by which means the gum in a cervical cavity can be held back, gently, but firmly, and the rubber dam held down without pain.

*Dr. Bogue*—When thin steel is put between two teeth that are some little distance apart, having approximate cavities, that one wishes to fill with amalgam, a steel blade thicker at the back than at the edge, of course, half an inch long, is passed through from the lingual aspect of the tooth to the buccal, to hold the thin steel against the cavity as the matrix. After the filling is finished, the blade is withdrawn first, and that loosens the steel without destroying the splendid contour.

The paper of the evening, by Dr. F. W. Stiff, of Richmond, Va., entitled "Dentistry as a Branch of Medicine should be Practised under the M. D. Degree," was then read by Dr. Wheeler.

(For Dr. Stiff's paper see page 21.)

#### DISCUSSION OF DR. STIFF'S PAPER.

*Dr. Charles O. Kimball*—In discussing this question, it seems to me the first thing is to go back to the fundamental question—what is dentistry? Is it a branch of medicine, or is it not? Is it a science, or merely an art? Upon the answer to that depends its status, and by so much the more the question of the evening as to the advanced education of the dentist.

As we think over the duties a dentist has to perform—taking first the one which is most purely mechanical—the adaptation of a complete denture, is there anything more than the action of a shoemaker in fitting a pair of shoes, or a truss-maker in fitting a truss to sustain a hernia? It seems to me there is more; for besides the mere mechanical adaptation of porcelain and other substances together, making the requisite appliance, there is necessarily a certain knowledge of the normal action of the parts and of the influence of these appliances upon the tissues of the mouth, which brings such an act among those bearing directly upon health.

As we go further into dentistry, passing for instance to the regulating of teeth, there we are doing the same work in a different way, that the orthopedic surgeon is doing—working to assist the natural development of the body. Of course, when we come to the consideration of pulp diseases, and diseases of the gums, there is no getting away from the fact that we are dealing directly with the living tissue and are in close touch with nature at every step.

Dentistry, when we come to look at it carefully, is not only a science, but an art. Both elements are there, for success depends not only upon what we know, but what we can do with our fingers. The proper education to meet these needs require not only a certain amount of didactic knowledge, but also the training of the hand with the brain, and of the eye, to meet the conditions and to successfully reach the desired result. Physicians recognize that in the sphere of the mouth well educated dentists have a parallel place with their own. Dentists are frequently consulted for obscure neuralgias of the face by their medical friends, who depend upon the dentist's judgment as to whether those troubles result from dental lesions or not. Practically here in the city we are often brought into direct consultation with medical men over diseases of the face and the mouth.

In view of that, it seems to me that any step that is taken to broaden dental education and bring it into line with medical education, is a wise one. It seems to me that we are entitled, from the nature of the case, to such an education as shall place us where we should naturally stand, by the side of the nose and throat specialist, or the ear specialist, or the oculist. They are practising upon one special organ of the body, and devote their whole time and attention to it. We are practising upon another.

The general plan proposed by the essayist I am inclined to think is a wise one—that is, the plan of bringing the matter before a State and making it compulsory in that State for a dental student after a proper time spent in study, ultimately to obtain the medical degree. I see of course difficulties in the way. The medical requirements at the present day are so vast and require such long and intense study, that it is difficult to see how a young man in the great majority of cases can achieve both courses without sacrificing too much time. But we need educated men for our work, and we need the elevating influence of that parallel education with the physician. We are not asking for recognition as a feeble profession, for in this world people get the recognition that they deserve. If we are fully qualified for our work from the medical, as well as the mechanical standpoint; from the scientific side as well as the artistic and artisan's

side, there will be no question about our standing in the community, or with our fellow-members of the medical societies.

But whether the plan proposed by the essayist and his conferees for achieving this result is the wisest one, I am more than a little doubtful. The mechanical difficulties in the way are great—we see so many dental students who have gone well through their work and have graduated, whose hands are all thumbs—they do not seem to know how to handle an instrument or to do the simplest work. We all know that to achieve success in saving teeth or even doing any good operations upon them the technique or the tactile sense of the dentist must be developed to a high degree. I do not see how it is possible to get that special training in the eight months he proposes—two months additional for each year.

At the same time, a young surgeon does not expect to get that tactile sense or training in his college course. He gets only a certain part of it. He expects when he gets through to take a post-graduate training in some hospital, and there he will practice for one, two or three years for the express purpose of bringing him into practical relation with the work, training his hand and his eye in the practical manipulation of his instruments.

These things, it seems to me, are what the dentist needs, and while I am inclined to think that the general step proposed for the State of Virginia is in the right direction, I am not sure that the details of the plan proposed are the best to bring success. Certainly there should be for dentists, as for physicians, hospital training. There should be opportunities for much post-graduate training in the use of their hands before they are fully fitted for the work which they have to do.

*Dr. W. B. Dunning*—I wish to express my personal regret that Dr. Stiff is not here.

Dr. Stiff has presented to us a most serious problem and one which cannot be too thoroughly discussed. I am sure I should not gratify Dr. Stiff, nor advance this evening's debate, by simply agreeing with all his views, and, as I desire to do both, I shall not hesitate to discuss certain questions that have suggested themselves in reading and listening to his paper.

No enlightened man concerned with the welfare of his fellow-beings can fail to realize that the dental practitioner must be a



worthy member of the medical profession, since he is entrusted with the care of an important part of the human body. That such a man should be prepared for his responsibility in the highest way, and that, being so prepared, the importance of his position should be recognized, can never be questioned by thoughtful persons. The desirability of a medical course of four or five years which shall graduate a man equipped to practice general medicine, but especially trained to practice the dental specialty—is a thing theoretically self-evident. But in dealing with a question of such wide and practical importance, it is necessary to consider not only what is desirable, but to keep in mind what may be done.

Much has been made of the indifferent attitude of the medical toward the dental profession, during the past seventy years, and much has been misapprehended in attempting to account for this seeming hostility or neglect. It is a simple fact that we dental practitioners belong to a new fraternity of specialists, as did once the surgeons, and that in our crude beginnings we were ignored by the older profession. Having to evolve from lower to higher things with the rest of aspiring humanity, we have progressed through a period of useful mediocrity—a history which must be common of all departments of human endeavor. We now believe we have earned an honorable and important position among the men who care for the human frame. But the old prejudice persists from within as well as from without, that the D. D. S. degree stands for no more than the certificate of an artisan, and the situation is not helped by a sort of slavish notion held by many of our fellows that the magic of the M. D. is the one thing to set us straight. Unfortunately, the best type of physician, and of dentist, while working for a common end, must often employ means and methods that are not all in common. I mean by this that the requirements in the two departments diverge widely. It cannot be said, as of the ophthalmologist, or the rhinologist, or the obstetrician, that the dental specialist, in magnifying one region of the body, may simply depend upon a modification of the principles of general practice as a guide in his course of treatment. Our medical friends have an insistent idea that this is the case, and that we are remiss in failing to see it. While of course much in the care

of dental and oral lesions must coincide with the general practice of medicine and surgery, a vast amount of our restorative work calls for a knowledge of mechanic and artistic principles which have no analogy in the treatment of other tissues of the body. We all know that the truly efficient dentist must be a master of these special requirements, even if his knowledge of the general medical field be somewhat restricted.

I wish to make it clear that I am not considering the case of the oral surgeon, whose work does not include the special operations and methods referred to. He cannot be properly equipped without the full training of the general surgeon and physician.

Our discussion bears solely upon the case of the *dental* practitioner, who in *addition* to physician and surgeon, must be an artist and a skilful mechanic. His ideal equipment calls for a greater range and variety of abilities than any specialist now practicing under the M. D. degree. The great question is simply this: Can a well-endowed but not extraordinary man become qualified to practice medicine, or dental surgery, or both, as he may elect, in a four or even six year course? Of course he should be a physician in fact, as in name, if he is to be given the degree.

The best medical school in the country to-day, having trained a bright man for four years, graduates him in a condition in which it is still important for him to seek a hospital appointment, and to put through two additional years of bedside and other practical work before beginning practice. It is notoriously a fact that a bright dental student, graduating with honor from the best dental school in the country, would be a far more dependable man could he avail himself of two additional years of post-graduate privileges. In other words, four years are not enough to make a physician nor are three years enough to prepare a man for the dental specialty. How, then, can it be hoped that, as Dr. Stiff suggests, a four years' course of medicine, plus eight months of dentistry, can be devised which shall graduate a man fit to practice both, or either one of them? With eight months of dental training could that student pass the present final examinations of our best dental schools, the advancing standards of which, as we all know, still leave much to be desired? His

cavity preparation and his gold filling—not to mention root work or bridge-case—would probably be things fearful and wonderful—however thoroughly he might be grounded in obstetrics. Then the great question recurs: For *what* is he preparing? We cannot get away from the iron condition that, if he is to practice dentistry, he must be trained to be a capable dentist, first, last, and at all times.

I have already stated my conviction that the full medical training behind the special dental equipment, as suggested by Dr. Stiff, is a thing greatly to be desired. Such a proposition I believe can have only one serious objection; that it is impossible in the time allotted by the essayist. Were it possible, there would be a second objection that the graduate would be all physician with no training worthy the name in his chosen specialty. A six or seven year course might compass the whole great field of work; but in making such an estimate two things should be borne in mind—the vast horizon of the modern physician on the one hand, and, with the dental surgeon, a degree of manipulative skill that can only fitly be compared to the finger cultivation of the musician who begins in boyhood. I believe I am not overestimating this need of throwing great emphasis upon the importance of early, continuous and thorough digital training. The postponement of practical dental work for four years would be a serious loss of adaptability to practical requirements, with the average student.

Dr. Stiff makes the point that if a dentist should practice under the medical degree which included his specialty—then a physician, under the same degree, (“knowing the *theory* of dentistry”) should be permitted, if he chose, to practice dentistry. As a matter of fact, about how fit would such a man be to perform dental operations?

I think we will do well to compel respect for the D. D. S. degree, by improving in every way the standard of requirements of the student, and later of the practitioner, making the man as much of a physician, in fact, as possible. If a man is to be a Doctor of Dental Surgery, why mince matters in designating his title? The intelligent public is being educated up to the fact that the mouth is a part of the human body; to be reckoned with in health and in disease. Surely our work is useful, therefore

honorable—but there seems to be a restless spirit abroad that we should be called by another name. I agree that our title should remind the public of our position and responsibilities. I admit the disadvantages of the obsolete and inadequate title of dentist; I wish we might devise a single word that would exactly describe our vocation. But it will not help matters to march under another banner for the glory of it, unless we can truly make that banner our own.

The discussion of this problem brings up the picture of two very different types of the future dental practitioner. The one is a man who has chafed at the thought of being classed as a dentist; some "friend" has hinted at social consequences, even in this republic, where all good work is respected. He has been haunted with a fear as to his professional respectability, and, working from that powerful motive, has put through a course for the medical degree which fulfills the letter of the law. He has worked hard and consistently, but not long enough to be really on a par with the "regular" medical man—and the dental part of his training has come late, and there has not been much of it. He has learnt much that he will never use, and is unfamiliar with many things of daily importance. The latter being chiefly matters of skill, have become difficult to acquire. His mind is trained for book knowledge, but he does not easily think at his finger tips. He knows more of anatomy and physiology and pathology than the average dentist, although he cannot approach him in special skill and knowledge. His valuable general knowledge is ready when needed, but his special deficiencies follow every undecided stroke of his instrument.

The other man began as a youngster with the idea of becoming an operator of the first rank in his special field. His course of four years in the dental school (note the four years' course, which is most certainly needed) threw the emphasis upon his special work, but gave him as broad a foundation of general principles as the time would allow. His manipulative skill was formed at the right age, and he has since been able to add considerably to his background of scientific knowledge, through habits of study formed at college. He is not a physician in the eye of the law, nor in fact, but he knows more of general medicine than he finds himself called upon to use. He can see beyond



the teeth and the month, is prepared to meet ordinary emergencies, and knows enough to consult, when in doubt. Needless to say his abilities, in ninety per cent. of his daily practice, are, from long training, of the highest excellence. Incidentally, he has lost no sleep in considering what others are thinking of him, and has always enjoyed the society of persons who, like himself, are intelligent and cultivated. He is a Doctor of Dental Surgery, and prefers to be known as such.

I believe the discerning public will have greater confidence in the latter's ability to render the special service which is now demanded, and that, as a professional man, he will not suffer in the estimate of his fellow-citizens.

*Dr. Weber, of Havana, Cuba*—We have in Havana one of the oldest universities in America. At the beginning, it was more of a book university, but now it is also a scientific and practical university. I mean by a book university that most of the teaching was done through books, and there was in medicine, for instance, very little laboratory and practical work. Now it is quite different.

We have in the university faculties of dentistry, medicine, pharmacy, science and literature, but the plan of work is somewhat different than in the United States. In Havana, the university belongs to the government, and the government controls the work of the university. It was at one time a private property, and it had its income from private sources, but the Spanish government took hold of it, since which time the university has been under government control.

To become a professor in the university one must pass an examination held in public competition. They do not allow foreigners, the requirement being that applicants must be Spaniards—now Cubans—to go into the University; but otherwise it is open to everyone.

The plan of work I think is very nice, and maybe it would be a suggestion to Dr. Stiff. We have a Rector for the University and each faculty has its own dean, which we call by another name, who has control of his faculty. We have the faculty of medicine, of dentistry, of pharmacy, of science, etc. For graduation before any faculty, one needs to pass a number of subjects. These subjects are, for instance, in dentistry, about twenty, in

medicine twenty, in pharmacy fifteen or twenty, and in science an equal number. Anatomy and physiology are studied by dental and medical students at the same time. Chemistry is studied by the pharmacist, the medical student, the dental and the scientific student, so that branches which belong to one, two, three or four are taken together.

One desiring to graduate in science, must take the branches of the faculty in science. If after graduating in science he wishes to study medicine, having already passed in chemistry, botany, physiology and several other things, he has only to take the seven or eight additional studies which are different in that faculty. A medical man, wishing the degree of dentistry, would need to take only the studies which are necessary to complete the number of subjects that are required for that faculty. I think this is a very good plan. I am sorry Dr. Stiff is not here to hear what I say. I do not think it is the amount of knowledge gained, but the preparation for the knowledge.

In Cuba it is necessary for a person to be a Bachelor of Arts in order to begin at the university. To begin with, one must have had two years' previous study to enter the institute where the degree of Bachelor of Arts is given. This degree takes four years, and in my time, although not now, we had to study Latin, chemistry, physics, logic and mathematics, and we got a general knowledge of everything. We did not know very much about each thing, but we had a general knowledge, and when we came to the university and studied chemistry, chemistry was not new to us. We already knew inorganic chemistry.

*Dr. M. L. Rhein*—The subject that we are considering this evening is one that has been very near to my heart for the past thirty years. I have been extremely pleased with Dr. Stiff's essay, as read to-night, and with the work that has been done by the society in the State of Virginia. The subject is one that has aroused so many bitter differences among men practising in the region of the oral cavity, that it is especially pleasing to hear it discussed in this unimpassioned way this evening.

While on a trip through Europe last summer with some of the gentlemen present this evening, we had quite an ocular demonstration of the bitterness that this subject can create among dentists.

I could readily feel the sway of ascending emotion that passed through this assemblage at the conclusion of Dr. Dunning's discussion of the paper, and I must say that I felt Dr. Dunning took the place this evening of a very able lawyer pleading for a lost cause. He did it well. He did it with a wealth of argument that reached home, and yet he overlooked entirely the important phase of this question, to my mind.

The subject is so dear to me that I trust I may be pardoned for bringing up a phase of this matter that has been overlooked by the essayist, and that I think is the one thing that should interest all Americans who appreciate not only the importance of our work to humanity at large, but who also feel a patriotic pride in what has been done in this respect by this country in the past.

I do not believe anyone who has studied this matter carefully can fail to realize that the present conditions of affairs would never have existed had, in the early period of 1840, we will say, the present conditions of knowledge obtained; such a thing as a special dental college would have been an impossibility. American dentistry was the outcome of the medical empiricism of that time, and the pride it has been to us as dentists has been due to the fact that medicine in those days was not practised on a scientific basis.

The fact was that that noble band of men who practised dentistry, and who were ostracised from medical circles, were really able to hold their heads higher, as far as their own conscientious rights of what they were doing was concerned, than the average body of medical men, because they were working in the open—on the mouth and the tissues they could see, and there was a much more logical inference and deduction in that work, than in that of the medical men. The result was, that American dentistry attracted to its ranks men who were able to hold their own as men with any men in medicine or any other profession existing at that time.

Now I ask you gentlemen—not the young men of to-day, but the men who have been in practice at least a quarter of a century—to visit the American dental colleges to-day, and compare the material that is entering these institutions—it makes no difference to me what city of the United States it is in—with the class of men who entered dentistry twenty-five or fifty years ago.

Some of us have sons who are in those colleges, who have been specially prepared to enter our profession. They are an exception to the rule, and they should be put aside and considered from another direction; but I refer to the mass of students, and personally, I feel that we have a great deal to be accountable for. In what? In the difference in the professional preparation of the matriculants of the medical and dental schools of to-day. There was no such difference among the matriculants twenty-five or fifty years ago, as far as their personal qualities were concerned.

The dental colleges of to-day are attracting the lowest strata of humanity. They are filled with it. Why? It does not require much investigation to know why. Because the medical schools require a degree of preparation and education such as Dr. Weber has spoken of in Cuba, such as we find in Austria, in Hungary, in France, and also in Germany, where they do not require the M. D. degree. But in this country, what is it? I have seen students matriculate in dental departments who cannot write English properly, who cannot spell properly. Some of them think it a creditable thing that they are unable to write even a decipherable letter; and as long as there is that difference in the requirements necessary to enter a medical and a dental school, a man may feel the calling of the dentist in his blood, but he feels the shame of mingling with the lowest strata of students in the educational halls, and it is impossible to take that feeling from him. I am sure this is the great cause that is degrading dentistry in our country to-day.

Dr. Bogue, Dr. Wheeler, Dr. Smith and Dr. Merritt were all abroad with me this summer. They saw in the city of Berlin one of the most wonderful exhibits of dentistry that ever human eye saw, and in it there was not a solitary American exhibit. What did it tell us? It told us that Europe has taken advantage of what this country has done in the past hundred years. They are equipping dentists not only with our technical skill, but with the scientific preparation that we are failing to give our graduates.

I desire to introduce this phase into the point of Dr. Stiff's argument, in order to sweep away Dr. Dunning's beautiful argument in favor of the present conditions. Dr. Dunning's argu-



ment would have answered thirty years ago; but to-day it has no place. It is not a question of pride in social calling. It is a question of our finding material that can handle this part of the human body in the future. I find an echo to what I say among dentists of ability that I have discussed this with—the inability to find graduates of the dental colleges to-day that we desire as associates. They are a positive disappointment to us, through and through, and it is due entirely to this point.

I realize that in taking this stand I am forced to take it in opposition to the position of a great many men who are very dear to me—teachers in our dental colleges, and what I have had to say is not meant as any personal criticism of them. It is the system of education that we are laboring under I criticise and not the men who are working hard to produce the best they can; but it is impossible, as one of our poets has said, to make a silk purse out of a sow's ear.

The other point I want to bring into this paper is this: I have discussed this subject in many places, and I have taken to some extent the view Dr. Stiff has taken, that at the termination of the regular medical course, between the semesters of those courses there is an opportunity for the student who desires to take up dentistry, to perfect himself in the technical course. I do not know why Dr. Stiff limits himself to two months. I said before the Stomatological Section of the American Medical Association that it is a crime for us to take young men in an educational institution, and give them a four months' vacation.

What young man going into business, or law, or architecture, or any other calling, at the age the student takes up the post-graduate study of dentistry, has a four months' vacation? The student does not require it. It is the observation of all teachers that students in the dental colleges fritter away most of their time the first two years, and the interval between their semesters is of such a lengthy period that when they come back at the end of the second year they might as well begin as freshmen, for all they remember. That is the opinion of most of the educators of this country. This lengthy vacation is for the benefit of the faculty. No teacher could teach twelve months and practice in between. It would kill anyone. Eight months is as much as any man can stand, and the fact I have tried to bring out is that

what schools need, is a professor with an adjunct, so a student may be occupied practically during the whole twelve months. A most sensible course would be a series of semesters during the twelve months with short periods of vacations between—an Easter week, a Christmas week, and in this country a Fourth of July week. This is the age when a young man should work with all his might and main, and not loaf at some fashionable summer resort for three or four months. This time could be well utilized, as Dr. Stiff has said, only I would make it four months each summer instead of two.

In the plan I have advocated, I have also taken up the point brought out this evening, that when the physician graduates in medicine, he does not dare to consider himself fit to go to practice. He takes his hospital course to get the practical side of medicine. The plan I had in mind was that when the student has graduated in medicine, and has had his different semesters in technical dentistry between, now for the first time is he really fitted to practice on a living patient in a dental infirmary. I consider it a crime to the populace for a city like New York or Philadelphia to put the ignorant students at work on human teeth, such as I have seen under so-called superintendence.

Think of the man who has had at intervals, four years of technical laboratory training in dentistry, graduated in medicine; and who now takes his infirmary course in a dental school while his colleague goes into a general hospital for the work he expects to take up. The dentist puts in his two years in a dental infirmary just the same as a man who intends to practice on the other parts of the body does in the general hospital. See the different kind of treatment the people who come to the dental infirmaries would get. See the educational differences that would exist to the public at large from the class of work that such men would be competent to give to the poor, as compared to what it means to send a servant or a poor devil to a dental college at the present time. The worthy poor would then get the sort of professional service in dentistry which they now secure in medical hospitals. Do they get that at a dental infirmary from a junior student now? And what is the class of service they get even from a senior student?

I would like these points considered in viewing the different

phases of the picture. I do not care for the degree of M. D.; the degree means nothing. I agree with Dr. Dunning that there are a number of men practicing dentistry with the degree of D. D. S. who know all of medicine they ought to know; but they can easily be counted, all that exist in the United States among the thirty thousand dentists. I have travelled among them, trying to find those who have this knowledge, and it is a pleasure to meet them; but I claim there are not many such men.

Therefore, the degree is necessary, not because of the letters, but because it is the only way to have the mass of men attain the knowledge which they should have. After a man with the M. D. degree has spent two years in a dental infirmary and he has shown he has the proper efficiency to do the work that his specialty requires, then I say give him the degree of D. D. S. in addition to his degree of M. D., and it will mean not only what it meant twenty-five or thirty years ago, but something still higher—it will retain for the degree of D. D. S. a lustre which in my opinion it is losing rapidly at the present time.

That is one reason why I am in great accord with this idea, and I believe if the State of Virginia is enabled to carry out the project it will leave a laurel wreath in the history of that State that will remain as long as dentistry is known or heard of.

I want to say to you, gentlemen of this society, before closing, that in taking the view I have on this subject, I take the position that there is no field of medicine, whether it is that of the general surgeon, the family physician, or any branch, that begins to compare with the value of the stomatology, to the human race, if the stomatologist is educated to a proper appreciation of that value. If the public once appreciates what the stomatologist can do for the human race, that day will see that stomatology does not drag along in the rear but little above the chiropodist. That day will see stomatology the foremost branch of medicine, and that is where it should rank, because it is the one province by which the body can be retained in a condition of health to a greater degree and for a longer time than anything else that is practised in the whole field of medicine.

*Dr. Dunning*—I feel that Dr. Rhein's impassioned eloquence has thrown into the shade anything I have said in my discussion of the subject; but there is one thing I strongly feel—there is no

one present who doubts either Dr. Rhein's sincerity, or mine. I am not conscious of pleading a lost cause, nor am I making apologies. I feel a little hurt that Dr. Rhein has failed to note that not in one word did I approve of the present status of the dental colleges. I simply expressed my doubt as to the feasibility of Dr. Stiff's suggestion. I kept harping on the point that we need improvement very much, and if I had Dr. Rhein's gift of speech, I might have colored the situation in a more graphic way.

I think I appreciate as much as Dr. Rhein the present needs of the dental colleges, and their great lacks; but on the other hand I think I see many weaknesses in Dr. Stiff's suggestions, or in any other general plan of trying to make a physician and dentist rolled into one, so to speak, in a short period of time. If we are to have a physician first, and a dentist later, with the two degrees, that is a different thing; but to run the two into one period of five years, and thus produce both an efficient dentist and capable physician—I think it impossible.

*Dr. Bogue*—I thought I approved of all Dr. Dunning said, but it seems to me that Dr. Stiff has brought before us, for our consideration, a subject which we may find in his title: "Dentistry, as a Branch of Medicine, Should Be Practised Under the M. D. Degree."

I took three courses myself in a dental college, under fairly good instructors. After taking those three courses I had two years of private tutelage, as well as the intervening months in sessions, and when I got through I was an assistant and found I knew so little that I was disgusted. Later on, I was still more deeply impressed with my lack of knowledge, and tried to make it up in medical college. So much for personal history.

I so far agree with Dr. Dunning in his view that a dentist, like a violinist, must begin early, if he would have the manipulative skill necessary to accomplish what he desires in his specialty, that I insisted upon my own son going through his dental training first, and then, considering what he had accomplished along those lines, insisted upon his going through a medical course, too.

Dr. Stiff, in the course of his paper, mentioned France and Belgium, but did not say much about England or Germany. Den-



tal history is being made all along; we are not the only ones discussing it.

Dr. Wheeler and some of the gentlemen who were abroad this Summer, confessed, I believe, that men in other countries knew something about it. I went over to learn, and was glad to feel as Dr. Wheeler does about it.

A slight error has occurred in Dr. Stiff's paper. France does not demand the M. D. degree. On the contrary, France passed a law which was signed in January last, establishing special teaching for dentists. The French government recognized the fact that dental operations were needed by all classes of the community, long before the medical men saw it. Medical men did not admit dentists to the position which some people thought they ought to have, and the government proceeded to do a thing which some of the medical men look askance upon, viz: To establish strictly dental teachings.

They have stipulated for private tutelage among the steps to be taken before the student shall acquire his degree. That is a step in advance. About two years ago—I do not know whether I am going to speak of open secrets or not—the Odontological Society of Great Britain, which had in its possession a marvelously good museum, a very considerable library, a not inconsiderable sum in its treasury and a fine membership—came into negotiations with men who were forming the Royal Society of Medicine of Great Britain. The result was the Odontological Society with its entire membership was received into that body. It is well known, of course, to every one here, that there is a degree known as the L. D. S. in Great Britain—the Licenciature of Dental Surgery—which corresponds pretty well to the degree of D. D. S. here; but the men who practice in hospitals have obtained the M. R. C. S., the surgeon's degree. That degree was procurable in Great Britain somewhat as the M. D. degree is procurable in this country. In England, however, the surgeons put on such stiff examinations that it was more difficult to graduate as a surgeon than as an M. D., and yet to-day the surgeon is Mr. Smith, Mr. Jones or Mr. Robinson, and not Dr. Smith, Dr. Jones or Dr. Robinson, except by courtesy. So when the dentist has obtained the degree which the general surgeon has obtained, he rather plumes himself on that; yet the whole membership of the

Odontological Society was included in the Royal Society of Medicine. So much for England and France.

Dr. Rhein has told us somewhat of the other countries, and as I see it Dr. Stiff and his associates are making an admirable move, because it is one little step toward showing the public as well as ourselves what is needed.

Dr. Dunning says we never can know enough. I want to make my compliments to him for the leading article that he wrote on that topic. We never can know enough for the practice of the profession we have chosen, and we shall be forever learning. It is almost immaterial how we do it. It has seemed to me the public is so densely ignorant about the facts which have been discussed this evening, that they look upon the man holding the M. D. as being necessarily superior. *Ipsa facto*—of course that is not true. It is true that the man who studies, whether he has a degree or has none, is by that much a broader man than the man who has not studied. It is also true that no man can practice dentistry until his fingers have been trained. I have never seen a man coming from the dental schools who was fit to go into my office without being shown how to do his work.

Our good friend McQuillan, whose portrait hangs on the wall, was very much offended many years ago because I took that ground then. I think I showed him finally that I took it in seriousness and without personal animus. All our life is compromise. If we are going to give ourselves to dentistry, we must consult with the medical men and call in the medical men to treat with us.

We must continually reach forward for an advance in our knowledge, and every suggestion, whether it be that of Dr. Weber—the manner in which the university in Cuba is arranged, or whether it be the suggestion of Dr. Stiff, which will make of practising dentists medical men within a few years—I consider them all elements in the growth of our calling.

*Dr. Wheeler*—First, I wish to congratulate the society on having Dr. Weber, of Havana, here to-night. I wish all could see the work he has done in compiling a catalogue of the various dental publications that have been issued during recent years. I have wished some of our American societies might secure a copy

of that catalogue. It was exhibited in Berlin at the International Congress, and was one of the finest things I saw there.

I think either some of the gentlemen who have spoken this evening are laboring under a misapprehension, or I am. In regard to the attitude of the various countries toward the D. D. S. degree from a careful investigation while abroad, I learned that in Italy the question is settled by a commissioner of education appointed by the King, and this commissioner has ruled that dentists shall have the M. D. degree. However, it is not satisfactory to the dentists in Italy.

In France, as Dr. Bogue said, they require the degree of B. A., or an examination equal to that. The German B. A. means about two years more work than in this country, whereas in France it means about two years less. In France they require an examination in the language of the country, before the student is permitted to take an examination in dentistry.

In England the British Association passed a resolution protesting against the demand of the Section of Stomatology, that no one shall be admitted to membership who was not an M. D., and in that resolution they requested all British dentists to stay away from that Congress. I think ninety per cent. of the dentists in England have no sympathy with forcing a medical education on the student.

*Dr. Bogue*—Does Dr. Wheeler mean to use the word “forcing?”

*Dr. Wheeler*—Yes; I mean just that. That is exactly what Dr. Stiff’s paper to-night stands for, if I am not mistaken.

In England many favor requiring a medical education before a man can practice dentistry. The English law is so arranged that while there are 4,700 registered dentists in Great Britain, there are 12,000 doing equally good work who are outlawed because the law is so unreasonable. That is the situation in England, and it is a most outrageous thing. There is no one who has the welfare of the dental profession at heart, who does not know that an improved condition in the dental college is needed. However, we must remember that while the medical man may get his education in four years, and may go into practice without the hospital appointment which is desirable and is striven for, a man in medicine or surgery is liable—nay,

is likely—to obtain a better income for less hours of work and less tedious work than the dentist. The proposition Dr. Stiff gives is to have the dentists put an initial expense into his education far greater than the medical man, with a possibility far more remote, of obtaining an income equal to that of the physician.

All the gentlemen who were in Europe this Summer will acknowledge that the condition of the mouths of the masses in England is deplorable. England is the worst, Germany next, and France and Italy next. There they are, quarreling about respectability, about what shall be required in a preparatory education, while the people are suffering. What they need in Europe is just what we need here. We need to have the course of dentistry established scientifically, so that the fundamentals shall be taught whether a man gets the M. D. or the D. D. S. He should know anatomy, physiology, pathology and therapeutics. He does not need gynecology, or obstetrics, or the fine details of the eye and ear, but having acquired those things which can be acquired quite as well in the dental college as the medical, he should give his attention to the parts he intends to treat, and to the technique, and he cannot do that and give his attention to studying the full course required of the man who is to obtain the M. D. It is an impossibility.

There is another thing. If the dentist is required to take such a prolonged course, the number of dentists will greatly decrease and therefore the condition of the public at large will become still more deplorable. Ninety per cent. of the people to-day are not receiving proper dental attention. That is true of all civilized countries. Dentists could be greatly increased in number and yet the needs would not be met. The primary function of the dentist is to serve the people, and if we make it impossible for him to serve the people, we ourselves are not serving the people.

Then, if he becomes so cultured, he will seek the most cultured districts, and the people who need dentistry in the towns and in the country will not be looked after, for the dentists will not settle there. The men become so educated that the surroundings are distasteful to them, and the country may never hope to get the same kind of service as the cities. The country physician is often a remarkable and wonderful man; but the dentist will not settle there.



*Dr. Bogue*—In England, to-day, the dental law is practically a dead letter, the reason for it being that the persons who enforce the dental law say the poor dentists must live, and the common people must be served; and in order to do that, they must have men who have not spent so much time and so much money in getting a preliminary training for their work. That is in accordance with what Dr. Wheeler says.

*Dr. Wheeler*—In England and Germany, there are trade laws which dentists may take advantage of and continue to practise. They must do it under a trade regulation, and they cannot be called doctors, or advertise as dentists, but they may make contracts with patients which must be lived up to.

One other thing, and I will close. It should not be forgotten that the specialist of the eye, ear, nose or throat is dealing with parts intimately connected with the vascular supply which may be affected by the internal dosing of medicine or other forms of treatment practised by the general practitioner. It is not so with the teeth. Internal medicine will not prevent secondary dentine, or prevent a cavity from getting larger,—at least so far as we know at present. The conditions of the teeth, the anatomical and chemical quality, with the vascular supply vary from any part of the system, so much so that the dentist's position is different from that of any other specialist in medicine. They cannot be compared, except when it comes to the relation of the surroundings,—the socket, and the mucus membrane.

Personally, I would prefer every man to study medicine, but I wish to point out that it is impracticable. It would be a crime against the public to enforce it at the present time, and I believe our energy would be better used in assisting the dental colleges to improve their curriculum rather than in trying to obtain the impossible, as is expressed in the paper to-night.

*Dr. Rhein*—How shall the dental college curriculum be improved if their admission requirements are so inferior to the requirements for admission to the medical colleges? The right class of men will not matriculate?

*Dr. Wheeler*—They are not different in the State of New York. The number of counts required of the man who enters a dental college in the State of New York, is identical with those required by the medical college. Cornell Medical School, and

P. & S. of Columbia have required the Bachelor of Science degree. Cornell has only twenty-five students, and Columbia has cut its classes in two; whereas New York University and Bellevue have twice as large a number. The counts are sixty in each school. There are colleges in the State of New York, who by every means known to the men responsible for their control try to evade the law, and succeed. Let us hope the day will come when that will be impossible.

*Dr. A. L. Swift*—This subject is one in which, as a teacher, I have been most profoundly interested, and while I would heartily favor any plan which would broaden the education of dental students, I doubt the feasibility of the plan as outlined by the essayist.

I coincide with the exceptions taken to this plan by Dr. Dunning and firmly believe it would be impossible to graduate students in five years who would be thoroughly educated physicians—as they should be if they receive a medical degree—and also thoroughly fitted to practice dentistry.

Dr. Bogue said: “A step in advance is a step in the right direction, but all advance steps should be most carefully considered, else they may react detrimentally. My suggestions from the teacher’s viewpoint would be, first, an advance in the preliminary requirements requiring the bachelor’s degree, the course to be elective, the student to be credited in his dental course with the subjects taken up and passed during his collegiate course. Secondly, I would favor a four-year dental course. This would give the colleges good material to start with, and with one more year’s time and the credits given students for prior work in chemistry, physics, physiology, hygiene, and other subjects, would permit of a much needed broadening and improvement of the curriculum.

“Dr. Rhein incorrectly stated that the preliminary requirements in medicine were higher than the requirements in dentistry in this state. They are exactly the same,—sixty academic counts, —forty-five counts upon matriculation, and the other fifteen to be made up before beginning the second year.

“Dr. Wheeler said some of the colleges in this State do not live up to this requirement. I know that the College of Dental and Oral Surgery of New York enforces this requirement.

"As to Dr. Rhein's reference to the four months' vacation,—some students are obliged to work during this time in order to help out with their expenses, but a large number take the summer Infirmary course.

"Dr. Rhein referred to the poor class of students in the colleges. In our college I have noticed a decided improvement in the class of students during the past two years, which is most encouraging.

"There are other points which have been brought out this evening I should like to discuss, but the lateness of the hour prevents."

*Dr. Rhein*—I regret very much if either Dr. Swift or Dr. Dunning took my remarks personally in any way, because I am a teacher in a dental school myself, and in saying what I did I am but criticising the system of American dental education. It is a great pleasure for me to have heard Dr. Swift's practical admission of the facts, as I stated them.

I may in the vigor of my remarks have made them sound a little stronger than was palatable; but after listening to his admission, I feel we are practically one in this matter.

Every one opposed to this subject has admitted the fact that if we could have all there is in medicine coupled with dentistry we would be better off. Admitting that the groundwork, the hypothesis, is correct, let us work to reach that point, and I say all credit to every means that will tend towards that goal. There always must be some master hand, some great man in the front rank to blaze the way that leads to the point we are striving for. I realize we cannot revolutionize American dentistry at once, or in a year, and I want to say that with all regard for my dear friend Wheeler, there is one point in his argument that I am totally at variance with.

Dr. Wheeler for the past few years has had uppermost in his mind this point—the great need for more dentists—the impossibility of giving people the proper dental services. As long as he restricts that to the children—that is to people under fifteen years of age—I am with him; but the moment he leaves that age, I am "agin" him, through and through. I am against him on this principle—and it is an important one—that when humanity once reaches what we know to be the age or period of *immunity* to

dental caries, they are much better off without any dentistry than with poor dentistry.

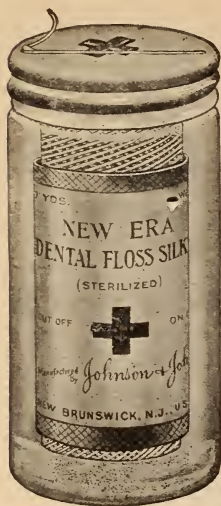
What this country needs is the teaching of preventive dentistry, rather than this mass of indifferent, imperfect dentistry that is given for a passing period, and in the end is destructive of the tooth. I have said over and over again that I would rather see a patient go with no dental interference than with something which is going to make him believe is helpful for six months or a year. It is in that respect, in the main, that I am at difference with Dr. Wheeler. I mean to say if dentists are educated to give the right kind of dentistry, they will get the right kind of remuneration. Why should dentistry get any poorer remuneration than any other branch of medicine? It has the reputation of doing that, because it does not give good service to the masses,—because they do not get better service than they pay for. If I have to work six or eight hours around the pulp of a tooth, my patients pay for it, and my patients are not willing to pay me unless they feel they get something for it.

The same in the country; if the people value their teeth sufficiently to realize what it means, they will pay for good service. The dentist who gives poor service gets poor pay. I would like it very much if Dr. Wheeler would confine himself to that class of humanity whose teeth really need expert attention.

*Dr. Wheeler*—As far as the institution which I have charge of is concerned, the Dental Department of Bellevue Hospital, only children are attended to, except emergency cases.

Adjournment.





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# THE JOURNAL

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## THE ALLIED SOCIETIES

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### YOUNG MEN WANTED.

Places are being vacated daily by men whose desire has been to do a man's work in a manly way and whose thought has been not first a dentist, afterwards a man, but the reverse. Sometimes a man is so slight and diffident that he is almost lost in the crowd of those who not only believe that "charity begins at home," but that her sweet face must always content herself by his fireside. This man-dentist is not always found in the luxuriously appointed office in one of the commercial centres. If however, he is found there, he may have seated in his chair, recently vacated by the man of wealth and culture, a little child, whose only claim upon his professional skill is, that the child is "one of the least of these." Nor will he be one whit less gentle or sympathetic because his fee is paid in coin not current in commercial circles. If he is asked whether his lucrative practice and social position give him comfort and satisfaction he will probably answer "To be able to meet my just debts without worry makes me happy only in that I am able to give closer attention to the honest day's work that I am seeking to do."

While the places occupied by such men in the cities are sometimes vacated and afford excellent opportunities, let not the young man congratulate himself that if he attains to one of them he has secured through passage in a "Pullman" to Contentment Island. Let him rather remember that to do a man's work in a great city is heroism, and not child's play. Some one has said "to whom much is given, of him shall much be required."

Many, and often overlooked fields are, however, to be found where the early morning in springtime are filled with the perfume of flowers and the singing of birds, and where the oriole builds her nest just outside the office window. There the dentists whose business it is do a man's work—and who does it—is judged by what he is and does for his fellow men and the community in which he lives.

Often the occupant of such a place has arrived at the time when “the grinders cease because they are few, and those that look out of the window be darkened.” He is simply awaiting the time “when the silver cord shall be unloosed” and the spirit shall enter into that rest which is reserved for the man who has faithfully finished his day of honest toil. He has spent his life almost entirely in the quiet town. His years of practice have been many and he has not always received the gratitude he deserved. He has taken in hand the poor boy and has as conscientiously cared for him as if he were the son of a wealthy father. If he has rendered any bill it has been a nominal one. He has put forth every effort, using money that he could ill afford in subscribing for journals, and attending society meetings, that he might perfect himself for service to that boy and others. He has rendered a class of service of which nine out of ten men in the large cities might be proud, and over which many of the more conscientious would blush because of their inability to equal. He has seen the poor boy grow from a poor lad to a wealthy man, and then has been pained to see him seek the services of a prominent city dentist who must be a good man because his fees are large. He worries not so much at the loss of the patient, as because he knows that the dentist to whom his patient has gone can not compare with him in ability. Did this dentist give up, and become discouraged? Not at all. This was only an incident. Very likely in the evening of the day on which he learned of the loss of the patient, he attended a meeting which had for its object the betterment of the conditions in his community. While men of wealth were there, and politicians “of the baser sort,” when need called for a man of integrity and intelligence to lead, he was chosen.

When young men in his town wanted to consult with some one who was absolutely unselfish and judicious it was he who was sought out, and from nothing did he derive more pleasure

than from the thought that he was useful. Has he been a successful dentist? Well, that depends. If success means to hold all the offices in the dental societies within his reach, no. If it means the accumulation of large sums of money, no. If it means a world wide reputation gained by constantly keeping oneself to the front, no. If, however, it means to live each day as a man should; to lose no opportunity to be helpful to others; to raise and educate a family of children so that they shall be helpful to posterity; to come to three score years and ten and have one hundred men in his own profession meet to do him honor, every one of whom were in hearty accord with the key note sounded by those chosen to speak, namely: "We come together to do honor to an excellent practitioner, and a man whose character after half a century of professional life is without blemish." If this is success, then most emphatically, yes. Young men are wanted for such places.

FRED MILTON SMITH.

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#### DISEASES OF THE UPPER RESPIRATORY PASSAGES AND THEIR RELATIONS TO ORAL DEFORMITIES.\*

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WM. E. CHENERY, M. D., BOSTON.

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As a result of the recent almost world-wide activity in oral inspection, dentists and physicians realize as never before that the greater portion of the people of all ages are suffering for want of dental attention. Lack of knowledge of the value of the teeth and how to properly care for them, is the reason. The present agitation is timely and will result in great good.

With added knowledge comes greater responsibilities to both dentists and physicians and a need of closer affiliation. We are waking up to the necessity of a hygienic mouth with normal secretions, and the value of every tooth, each in normal occlusion as great factors in good health. The general physician has largely given over the care of the mouth to the dentist and the rhinologist and the responsibility is growing more important as facts develop. The opportunity is now given to the dentist of rising above the mere mechanical art of extracting, filling and supplying artificial

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\*Read before Boston and Tufts Dental Alumni Association, Dec. 15, 1909.



teeth. There is a chance to assert your right to a proper place as a specialist in a most important branch of medicine. With your intimate knowledge of the teeth and the care of the mouth preventive medicine may be materially advanced.

The tendency is to hurry through our anatomy, physiology, histology, pathology and general surgery but they are the essential basis for good work. You ought to have a better knowledge of the border line specialties which have their influence on the teeth and mouth. If pathological knowledge and general surgical technique and skill were developed by the dentists, the diseases of the mouth affecting the health of the individual might well be cared for by him. You are capable of caring for a part of these conditions, why not the whole?

It took a *singing master*, Manuel Garcia, to invent the forehead mirror and show its possibilities, and a *dentist* introduced anæsthesia to the surgical world. Why should not the dentist with his superior knowledge of the condition in the mouth and his instrumental and mechanical ability be skilled in the examination and treatment of the neighboring nose and pharynx which play such an important part in his own specialty

We do not so much need a larger materia medica as we do a better knowledge of the normal in nature and how to maintain it. Pure air and pure food properly prepared are the greatest essentials. A robust constitution demands a certain amount of each to nourish the body and supply resistance to the inroads of disease. According as we limit the supply of pure air and pure food we restrict development and health. Definite amounts of proteids and carbohydrates are necessary to maintain the body weight and strength. But it does not so much matter what the food is, providing it be a mixed diet, as how prepared and how treated in the mouth. The sense of taste we know must be right to stimulate the flow of saliva. If the voluntary part of digestion (mastication) is right, it is rare to have digestive disturbances. In this connection the latest utterance of Horace Fletcher is worth quoting: "five years from now it will not be considered respectable to be sick." While this prophesy is overdrawn, we should nevertheless keep pace with the 1915 spirit of agitation, for *this*, at least, is true, if food either through negligence or mechanical inability is improperly prepared in the mouth, or if it is there made impure by pus from diseased gums, decayed food

or bacteria from carious teeth, then stomach and intestinal diseases and impoverished blood will surely result. A little more care of the teeth and thorough mastication means less need of selective care in diet. The 20 or 30 square inches of surface in the mouth, with innumerable places of lodgment for bacteria, need to be kept clean all the time so that food shall not there be infected and rendered a menace to health. Irregularities of teeth afford more opportunities for decay, also imperfect occlusion interferes with the proper grinding and mixing of food. Often we bolt food, many times the cause of this bad habit is started by the teeth themselves. Irregularities of the teeth not only interfere with proper mastication but improper interdigitation of the cusps interferes with the normal symmetrical development of the jaws, and so affects the formation of the face. Thus the teeth play an important part in personal beauty.

The function of the saliva aside from its part in digestion is to moisten the mucous membrane and the food. It assists in forming the bolus which later is thrust back by the tongue to the fauces, and thence carried onward to the œsophagus. There remains much to be learned about this physiologic secretion; without it mastication is difficult and digestion imperfect. How does it differ in health and sickness? What are the results on the stomach? What effect have the different kinds of food on the saliva? What is its relation to caries of the teeth?

The mouth is nature's avenue for the food supply. Let us now see how nature supplies pure air to the lungs.

At the very entrance to the nose we find the moistened hair-like vibrissæ placed there to strain the air. The moisture on the mucous membrane further assists in collecting dust and bacteria and little cilia tend to whip the foreign material toward the entrance of the nose. We should expect to find numerous bacteria in the vestibules, and in fact they are there in so great numbers it is almost impossible even with the aid of a speculum to pass a sterile platinum wire loop into the interior nares without infecting it. However, the normal nose is sterile in its *inner* portion, due to the straining at the vestibules and the probable germicidal effect of the mucus.

Various attempts have been made to test the bacteriology of the interior of the nose. Some claim that staphylococci and streptococci are always present; others, according to their

care in technique, have found occasionally sterile nares and few bacteria. The more careful the technique the less likely there are to be bacteria. Dr. F. C. Cobb\* recently reported his findings in sixty cases; of these he found fifty-five were sterile while staphylococci were present in five. By sterilizing the vestibule with dioxygen or corrosive sublimate solution, even by taking his culture through a sterile rubber cot he found it hard to get an absolutely sterile nose, staphylococci usually being present. But by sterilizing the external nose and the vestibules with Harrington's solution for three minutes and using a speculum covered with a rubber cot he was able to get the vestibule free from all germs, and fifty-five out of sixty, sterile in the interior portion. He suggests faulty technique as the cause of failure in the other five cases.

#### HARRINGTON'S SOLUTION.

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The nasal chambers are lined throughout with mucous membrane and on the outer wall of the nasal fossæ are situated the turbinates. The air eddying through the nose comes in contact with these little coils and the mucous membrane, and so, becomes warmed or cooled, as is needed to body heat, and at the same time the air is saturated with moisture. The lower turbinates, having erectile power, by swelling or contracting, make the nasal passages larger or smaller, thus acting as governors to the inlet of air.

If the nose is approximately normal and free from obstruction inspiration and expiration should on most occasions take place through the nose. It is nature's way. Then the air causes no irritation, but is properly purified and prepared for the delicate tissues of the larynx and lungs. Moisture in the normal nose is provided in just the exact amount needed so that there is neither dryness nor excess of secretion necessitating the use of the handkerchief or hawking and spitting.

If we breathe through the mouth for a considerable period, the mouth and pharynx becomes parched and inflamed. The throat burns and cough is produced from irritation and because

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\*Cobb, F. C. Transactions American Laryngological Association, 1909.

of perverted secretion. A pharyngitis is produced and the general health is sure to be affected if long continued. The recent experiments of Dr. Willis S. Anderson\* on the effects upon the respiratory and general systems by nasal obstruction are interesting. Guinea pigs, rabbits and dogs were used and closure of the nostrils was accomplished; with the smaller animals by means of cotton and collodion, with the larger ones by denuding the surfaces and suturing the nostrils. For prolonged experiments the latter method was found better. The guinea pigs that lived over forty-eight hours breathed partially through the nose; thirty-six hours of life was the average when the nostrils were closed tight. Distention of the abdomen occurred from air being swallowed; often this was very noticeable in an hour, especially if food were taken. The rabbits lived longer but the longest only 113 days, the shortest four days. Their abdomens did not distend, but their weight decreased and by the time half the body weight was lost they died, and autopsy showed dilatation of the heart or some lung infection. Eighteen dogs were experimented on with partial or about two-thirds closure of the nostrils, and twenty-four puppies born of mothers who had nasal obstruction. Labored breathing, asthmatic in character, was a constant symptom, which increased on exercise. It was noticed the hair become shorter, thinner and lighter in color and lost its natural gloss, and wrinkling of the skin appeared. The younger dogs died within three months of infection or broncho pneumonia. Of the puppies born of mothers whose nostrils had been partly closed, over half died before three months. They seemed handicapped and did not develop as normal dogs should, but gradually showed evidences of mal nutrition.

He draws these conclusions:

"Nasal obstruction leads to death or serious impairment of vitality."

"The lowered resistance predisposes to infections."

"Local diseases of the respiratory tract are induced."

"Obstruction of nostrils leads to dilatation of the heart."

"Changes in the skin and blood and symptoms of asthma and emphysema are induced." And lastly but very important,

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\*Anderson, W. S. Transactions American Laryngological, Physiological and otological Society, 1909.



“reopening of the occluded nostrils is followed by prompt disappearance of the symptoms.”

From these experiments it is evident that mouth breathing is most pernicious in its effect. It is as important in human beings as in animals.

What are the common conditions or diseases which interfere with normal nasal respiration? What are the results of interfering with this normal air course and its effects on physical and oral development? What can we do to prevent, and when?

At birth the cranium is very large as compared with the face; this develops afterwards and its development is affected by various conditions which influence growth up to the twentieth year. Normal children usually start right by breathing as nature provides, through the nose; they seem to have no difficulty in so doing. I have said we should breathe equally through both nostrils. Anything interfering produces a pathological condition and the effects depend very much upon the length of time the obstruction exists, and whether partial or complete. There is an atmospheric pressure of fifteen pounds to the square inch, any less than this causes a vacuum. If the child has a slightly deviated septum or the nostril is partially blocked, then a vacuum is produced back of the obstruction. The blood pressure within the tissues is the same, but there is less pressure from without or in the nasal fossa; this favors dilation. An increased blood supply means more secretion and finally growth of tissue, in other words hypertrophy, which at first depending on the cause, is transitory and then permanent or hyperplastic. This is especially noticeable in the inferior turbinates, and the anterior ends of the middle turbinates. As a rule the face is perfectly formed in utero, but by prolonged labor or by the face resting on the pelvic bones or by instrumental delivery, the septum may be slightly injured at birth. Again, as so often happens, the child develops a slight nasal cold in the early days. Trouble is started, for whatever blocks free nasal respiration interferes with the necessity of life—oxygen. It must be obtained, so mouth breathing is favored. At the very beginning of life a pernicious habit is encouraged, and if the obstruction becomes permanent there are tissue changes, more or less permanent and mouth breathing becomes a necessity. Every cold tends to make conditions worse. An acute rhinitis becomes a chronic rhinitis, the nasal chambers are no longer

sterile, but full of muco-purulent secretions. With a vacuum in the nose and atmospheric pressure upward from inhalation of air through the mouth there is a tendency to raise the palatine arch. The roof of the mouth is the floor of the nose, so there is a tendency to narrowing of the nostrils, at least the developmental widening is handicapped. With interference of nasal breathing the lymphoid tissue in the postnasal space swells, becomes hypertrophied and thus gradually we have produced the adenoids. The acute exanthematous diseases of childhood, such as scarlet fever and measles, seem to specially favor lymphoid enlargement. Each succeeding cold causes the adenoids to enlarge and at length become more fibrous. The result is marked interference with nasal breathing and the necessity of mouth breathing much of the time, especially when lying down.

During the early days the nares are small and only slight obstructions are necessary to stimulate mouth breathing. Overheated rooms, too many clothes and improper feeding all have bad influences. They make the child unable to withstand sudden changes in temperature and bacterial invasion. Lack of nasal cleanliness in young children is often a strong factor in producing mouth breathing. The natural protection of the nose is lost, and pharyngeal irritation, inflammation and infection takes place. The tonsils which are only a part of the same lymphoid tissue in the back of the throat become hypertrophied and infected. Of course we must always consider the shape of the face and nose inherited. But I believe mouth breathing early established is a very strong factor in moulding the round baby face into one long and pinched, with narrow nostrils. A seemingly slight evil habit early, begun is of great importance in shaping the jaws during the plastic stages of dentition. Non-use of the alae muscles which dilate the nostrils allows collapse, non-development, later impedes and makes difficult nasal respiration at the very commencement of the air tract.

What are the diseases that produce mouth breathing in children under the age of fifteen? The age of puberty is taken because by this time the children's diseases are over and the teeth are nearly erupted. Habits and deformities are well formed by this time. In the throat department of the Boston Dispensary not long ago I looked up the records of 3,000 cases of children under fifteen. The chief conditions for which they applied for

help were acute rhinitis  $3\frac{1}{4}\%$ , chronic rhinitis 5%, deviated septum  $4\frac{1}{2}\%$ , acute tonsillitis 6%, and 64.8% for adenoids or enlarged tonsils. These comprised about 85% of all cases treated of this age or under. These figures tell this story: A so-called slight cold or rhinitis produces inflammation of the nasal mucous membrane, renders the membrane of the upper air tract weaker and more susceptible to succeeding colds. A deviated septum favors irritation and lodgment of secretions. The acute condition leads to a subacute or chronic state with increased secretion and bacteria. Hypertrophy is the rule, nasal respiration is interfered with, and lymphoid enlargement results. The variety of diseases in the upper respiratory tract of children is not very large, but because they are more or less obstructive and accompanied with tissue changes they all tend to produce mouth breathing.

Why is mouth breathing so injurious especially in childhood? First, air, improperly prepared, is carried to the lungs. Oxygenation does not take place as it should. Respiration through the mouth is not as deep as through the nose, therefore interchange of gases in the lungs is not sufficient. The injurious carbon dioxide is not liberated from the lungs and the blood does not get as much oxygen as is needed. It has been proven there is a rapid increase in the red corpuscles after removal of nasal obstructions. From lack of normal air pressure in the nose and nasopharynx and irritation, hypertrophy is favored. Increased blood supply means excessive nutrition and growth, then further blocking and opportunity for bacterial cultivation and invasion. This affects especially all of the lymphoid tissues in the back of the throat which are included in Waldeyer's ring, the pharyngeal tonsil or adenoids, the faucial tonsils and a fourth tonsil situated at the base of the tongue. Adenoids constantly secrete and besides interfering with voice sounds, make nasal respiration more or less difficult. The proximity of the adenoids to the eustachian tubes is a constant menace to the ears for middle-ear infection and deafness frequently result. At first in mouth breathing the jaw drops a little and the lips slightly part, after a time the mouth opens a little wider, the upper lip shortens and becomes thicker and later because the upper lip is not used and the nostrils are not dilated there is collapse of the alae and lack of developmental widening of the nares. Later a pinched appearance to the face is produced, imparting a stupid look. The mental development is

handicapped. Frequent nasal colds are common, restless sleep which is most exhausting and debilitating is the rule. The effect on the formation of the dental arches is interesting. With the eruption of the teeth the face grows. Usually the deciduous teeth erupt with perfect occlusion but we should be sure the first and second temporary molars are in right position, for *they* may be factors in early mouth breathing because their little cusps do not interlock properly. The lack of opposing push from the tongue, because it lies in the floor of the mouth, and not against the teeth, may cause a tilting of these teeth. By the strong buccinator muscles we should find one little cusp of the lower molar in advance of the upper molar, and the upper molars should rest astride of the outer or buccal row of cusps of the lower teeth; if not we have an irregularity. If these teeth are not right then the first permanent molars, which should be guided into proper position by them, will go wrong. If there has been one sided, anterior nasal obstruction or loss of teeth on one side the arches may not be symmetrical. We must remember the temporary teeth are replaced by much larger teeth, so at about three and a half to the fifth year there are signs of enlargement of the dental arches, at this time the temporary incisors begin to separate from each other and at about six the first permanent molars, which are the real keystone to further development, appear. We must not forget the value of closed lips in moulding the anterior arches. The closed lips should counter balance the thrust of the tip of the tongue and thus assist the incisors into their proper place. In the early years of life, sickness such as measles, scarlet fever, rickets, producing mal-nutrition, may leave its marks on the permanent teeth, but the result of nasal or postnasal stoppage is mouth breathing, which produces lateral crowding of the teeth leading to marked irregularities. If the chief trouble is enlarged tonsils we are apt to find a protruding lower jaw; while if adenoids are most prominent we have the V shaped arch, with central teeth turned toward each other often overlapping, and a decided over bite. This is a very common condition.

If the nasal, postnasal or faucial obstructions are removed *early* and the mouth breathing habit overcome, so that the air travels in the right way and the lips are closed not too tightly, the normal occlusion will usually be restored. The lips, cheeks and tongue with mouth closed will assist in moulding the arches and



direct the teeth during the expansion period to make room for the larger, and also the extra teeth.

Because obstructions in the upper air passages are so frequent their signs should be watched for by physicians and dentists. Frequent colds are not simple things! The anterior nares must be kept clear; if turbinates enlarge and do not yield to soothing local treatment and constitutional building, they must be reduced by surgical means to the normal and deviations must be corrected, otherwise more marked and difficult conditions arise. If there is not a normal air current through the nares it will not broaden as it should, the floor of the nose will arch upward. From this narrowing we get difficult and insufficient inspiration and inability to thoroughly clear the nares of secretion.

We must not consider as trifling mouth breathing in early childhood. It must be remedied as soon as possible, it is usually easy at first; it may be possible later in life. If nasal breathing is unobstructed and care is taken to see that the child does breathe good air and properly, there will be fewer adenoids. If they are present they should be removed before bad habits are fixed. The best time I believe is from the third to fifth year, for it is necessary that obstruction to nasal inspirations be removed and the habit of nasal breathing by night as well as day be established before the changes resulting from second dentition take place. It is at this critical period that attention on the part of dentists and rhinologists is needed, for then a little prevention will mean much for the future health of the individual. Symmetrical enlargement of the jaws and nasal fossæ are interdependent and their development depends much upon unimpeded respiration through the nose with mouth closed. If proper nasal breathing is carried on, the normally healthy child will develop nose, jaw and teeth right. Of course the thumb sucking and other bad habits must be eliminated. It is important to retain every deciduous tooth as long as it is needed to guide into place its successor. Every tooth has a function and should be cared for and saved. A careless extraction will change the whole chain of events and interfere not only with the proper development of the dental arches, but be reflected in the developmental widening of the nasal fossæ.

In conclusion,—the first need of the new born babe is oxygen. If sufficient air is supplied by day and by night in the proper

channel provided for it (the nose) and the stomach is supplied with a sufficient amount of food, the child will grow rugged and strong, with teeth in good occlusion. With improper breathing oxygenation is imperfect and the general health and development is much handicapped.

Mouth breathing during the period of dentition is very harmful, especially during the early part of second dentition. The balance of forces is upset by mouth breathing and at this crucial time symmetrical development of the nares, maxillary and dental arches is interfered with. Nasal and postnasal obstruction should be removed before this time and habits corrected in order to restore this balance of forces and permit normal development.

It is important to see to it that irregularities of teeth are early corrected whether of first or second dentition and preservation of all the permanent teeth should be maintained. Unilateral breathing is reflected in the dental arch development on the same side, and also unilateral loss of teeth will influence the development of the nasal fossæ. The time to restore nasal breathing is early, before serious damage is done. Complete removal of adenoids by curette and tonsillectomy by blunt dissection and snare are the approved modern methods.

Finally: Right development depends on air and food properly prepared, sufficient in quantity and quality and the maintenance of nature's plan, also early correction of little faults which uncorrected later dwarf the development of the whole. Each part depends on the other. 222 Huntington Ave.

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## THE PRESENT STATUS OF THE GOLD INLAY.\*

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BY HENRY W. GILLET, D. M. D., NEW YORK CITY.

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Mr. President, and gentlemen:—Dr. Wheeler, Chairman of our Executive Committee, approached me in rather an insidious manner, one day not long ago, with the statement that his essayist had failed him for this evening, and if I would help him out, I would be privileged to talk, and he would have a stenographer here to record all I might say. I inferred from the way he spoke, that he realized that talking was my favorite form of exercise. Whether or not I make good in my exercises

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\*Read before The New York Institute of Stomatology, January 4, 1910.

tonight, is of course an open question; but if I do not, please lay it all to Wheeler.

When he first spoke to me, I questioned whether I had anything that was new enough to be worth while talking about before The Institute; but whether that day or the next, the representative of what would probably be considered the leading dental laboratory in the city, was in my office, and made the remark to my laboratory man that gold inlays were getting a black eye; and when I followed the question up, he stated that so many men were having unsatisfactory results with gold inlays, that they were giving them up. As I have not yet reached that stage myself, it seemed to me that his remark would provide me with a text, and while it might not be a new subject, I felt if any such idea is getting abroad, it would at least provide an opportunity for quite a good deal of my above mentioned favorite exercise before we got through.

Speaking on the subject in this way, naturally I will talk along the lines I follow in my own practice, and presumably I shall be betrayed into making some more or less dogmatic statements; so I want to premise my remarks by stating that I do not for a moment intend to advance the idea that the particular processes that I follow out in my practice are the only ones that will result in the making of satisfactory gold inlays. I will say at this point that in my usual procedure I follow what is known as the impression method, and I have not the slightest question but that equally good results may be obtained by what is known as the direct method. In fact, I am quite sure that is the case; but for several reasons which I will explain as we go on, I prefer the impression method. Those points of difference hinge upon matters of the personal equation, and of the office equipment of the man doing the work. A man who has at his command an efficient laboratory assistant, will get results with the impression method that would be hardly possible, and certainly not practicable for the man without such assistance. On the other hand, the man who is doing his own casting and carrying out each step with his own hands, would have a much larger proportion of cases in which he would get satisfactory results from the direct method than I would find possible, because I should not be willing to take those steps myself.

To go back to the main text—that is, that gold inlays are

getting a black eye—I am going to read about three-quarters of a column from the “Dental Cosmos” for April, 1907, being part of my own discussion in this room of Dr. Perry’s “Discussion of the Merits and Demerits of the Gold Inlay.” At that time, I spoke as follows:

“When Dr. Nyman told us about gold inlays that could be finished so that one could not tell them from the best gold fillings—well, I have a great deal of confidence in Dr. Nyman, but I smiled. It was not very long before a case presented in which I had to have something different from what I had been doing, so I tackled the gold inlay. It was not more than ten days before I began saying that I was through making large gold foil fillings; and since then I have taken an even stronger stand on this point. Those of my patients who have had gold inlays inserted are now unwilling to have foil fillings. In one or two cases, where cavities had been prepared for foil fillings, and by reason of circumstances gold inlays had been made for other teeth in the same mouth, before these large fillings were completed, both the patient and I had difficulty in getting on with the fillings; it seemed very irksome. I say all this with the full knowledge that there will be about a ton of perfectly awful gold inlays made in the vicinity of New York in the next year or two. The same men who make sloppy amalgam fillings, and worse gold fillings, leaving projections of the amalgam and gold sticking into the gum, will make the same kind of gold inlays, and we will shortly hear what terrible damage gold inlays can do. They can; but gold inlays can be made that will be a great deal better for the tooth than the large fillings that we have been making so laboriously, because we get a support for the walls that we do not get from the foil fillings. They can be finished just as perfectly, and with much less strain for patient and operator.”

I am willing to stand by that statement at the present time. It was made in March, 1906.

Since that time I have seen no reason to change my estimate concerning the gold inlay. Perhaps the only modification that I would make concerning that general statement—that I was all through making large gold foil fillings in the mouth—would be that I have come to recognize in a certain type of bicuspid—a bell-shaped, lower bicuspid in particular—the difficulty of



making a satisfactory inlay; but even that difficulty may be overcome by making the inlay in two sections. In fact, I am even more extreme at the present time concerning the merits of the gold inlay than I was then. I am in the habit of saying to my patients that I have greater confidence in my gold inlays than I ever had in my gold foil fillings, and as some present know, I tried very hard to make good gold fillings for many years before we had gold inlays.

It has also been interesting to me to note that many of the men who are taking the same stand concerning the gold inlay, are men whom I know are striving to do and are doing the very best work in our profession—men who are striving to give their patients the best and most serviceable attention they can.

While I am talking, Mr. President, I think it would be well to start these fibre boards around; they have some demonstrations of technique on them which I brought along for this reason:—at the moment I was writing my letter to Dr. Wheeler, telling him the subject I had thought of speaking, one of the leading members of The Institute came to call. I happened to have several practical cases on the shelves ready for the succeeding week's appointments, and in showing them to him, the subject of my talk came up, and I asked his opinion concerning the advisability of showing the steps in technique. I found the technique as I am following it out was not familiar to him, and he so heartily approved, that I decided to present this matter here just as if it were a kindergarten. A lot of this material will not be new to some of my hearers—in fact, to some present not one step of it will be new; but there are some who will find new material in it.

On this first board, I have placed the different materials and steps for getting the impressions. Possibly the particular procedure which I follow in getting the impression may be a little different from that followed by most of the men who use the impression process. I am using the Detroit Impression Compound—and it is shown here in the large cake and in the round stick. The large cake I cut into strips from which are made these little cubes. In ordinary practice I touch my fingers to vaseline, and holding one end of the cube over the lamp until its corners are rounded, I turn it, and soften the other end, until that is of the right consistency for the impression. If there is

any likelihood of the impressions not drawing satisfactorily, because of the shape of the tooth, or the space between it and the adjoining tooth, it is my habit to slip in a little matrix just as if I were building a filling there, except it is a narrow matrix, usually not coming to the occlusal surface, and if there is a decided contour, so there is likelihood of the impression material flowing down, so it would break in removal, I wedge the matrix snugly against the margin, generally using cotton. I can hardly define just what the dividing line is, but there are other cases in which I use the matrix, but wedge it loosely, with the idea of controlling the tendency of flow from the margin, and yet of allowing it to go between the matrix and the tooth surface below the cavity margin. The contour of the tooth at this point is of importance. In bell-shaped crowns I would wedge the matrix tightly at the cervix so as to prevent overflow and consequent locking of the surplus below the contour and in the opposite type of tooth; I often prefer not to wedge snugly.

After the matrix is in place, I use the pointed piece of compound with the softened end, and I find that I am drifting almost exclusively to that way of taking my impressions, in preference to the way I followed for a long period, of using the Roach impression cups. First, I discarded the handle from them, then I enlarged the opening, and kneaded the material through the large opening, to get a sharp impression; but I find the compound cone in this form with a stiffer base, enables me to get a sharp impression more readily than with the cup.

Next on the card are two impressions, with the matrices in place; then there is one invested in plaster ready for packing the amalgam die, next is the same with the die packed, and then the die as it comes from the investment.

Here are the two forms of wax which I prefer for bites. I am getting more satisfaction from the pink wax shown. We have here a bite as it comes from the mouth; then one trimmed ready for the die to be placed in its seat, and finally an impression with a die in place.

These three articulated cases are not as nicely smoothed as I would like. They are cases from every-day practice as they go through my laboratory.

Here are two amalgam dies in their seats in the articulator, with the wax built into them. On the right is a single inlay in

the die—a duplicate of one in the mouth of a gentleman in this room, except this is 24 caret gold, and he has platinized gold in his mouth.

These others are also cases in practice. The middle one of the three I shall call to your attention later, in speaking of what seems to me a difference between the possibilities of the direct method, and the impression method.

On top of the board, will be found a demonstration of something that is exceedingly helpful to me in my practice. You will see there two ordinary typewriter's erasers. They are from different makers, and are of different grits. On the other side are wheels which have been cut from these erasers. They are very useful in finishing. The laboratory man dresses the inlays to shape with carborundum stone, and follows with these rubber wheels, the rougher one, and then the finer one. When they come to me, if I find a need for modifying the contour or occlusion, the repolishing is very quickly done. It is done so promptly, that it is really a joy to have an appliance that will work so satisfactorily.

About the same time Dr. Wheeler requested me to appear before you, I happened to have a patient come to me by recommendation of one of my own patients, with a mouth full of gold inlay work. The one thing I am thankful to him for is that he has not told me who made the inlays. I do not want to know. They must have cost him from \$1,000 to \$1,500, and they would be a disgrace to an advertising dentist on Third avenue. There is not a contact point between any two inlays, and there is not a satisfactory cervical margin in the mouth. What can we expect if men do that kind of work, but that gold inlay work would get a black eye? I should expect to get a black eye myself, if I treated my patient that way.

And that brings me to four points, in which it seems to me the gold inlay is superior in its qualifications for our comfort for doing our work, for our patients' comfort, and for the possibilities of service we can render them:

1. It is so readily possible to be sure the gold inlay has the proper contour—that it knuckles just exactly right with the adjoining tooth.

2. It is so readily possible to provide it with the proper

occlusal shape, so is shall not only appear well, but be serviceable as a portion of the grinding apparatus.

3. It is so easily possible to supply between the gold inlay and the sensitive portions of the tooth, a layer of non-conducting material.

4. It is so easily possible to finish the inlays in a way equal, if not superior, to what the best operator may do in gold foil work, that so far as I am concerned, I am unable to see that the foil filling has sufficient claims to enable us to consider it for a moment as a candidate for the same places in general work. I am quite ready to admit that at the present day our cements are a weak point—that there is probably a difference at that point in favor of the properly made foil fillings; but when I compare that side of the question with the advantages the gold inlay has over the foil filling, it seems to me the foil filling is put out of the running—that it cannot be considered.

One of our leading operators said recently, in my hearing, that it is remembered in considering the gold inlay, that gold inlays have to be provided with a way of going into the cavity, and that unfortunately they can come out in the same way. To be sure, they can; but if that is the only objection, it is very easily met. An operator who can not cement an inlay in a cavity so that it cannot be dislodged in the direction in which it was inserted needs instruction; but when gold inlays are made which can come out of the cavity in any direction, that is a different matter.

No gold inlay is satisfactory in its shape, unless when dropped into the cavity, it shall be impossible to dislodge it by mechanical force in any direction but the one direction in which it went in. It must be so locked in the cavity that it cannot be removed, except in the one direction, and when that is done, I am not afraid of my inlay coming out.

One of the advantages I want to speak of, is the adaptability of the gold inlay for cases that we have been in the habit of crowning. Of course, we have had arguments of long standing concerning the harm that may result from the use of gold bands around the roots of teeth. We have seen many instances where harm was done because the operator did not fit his gold band properly, and some of us have contended many times that if the gold band was properly fitted, it did no harm. However, I



imagine most of us who have made that statement will feel better satisfied when we think it over, to know we have a nicely finished gold inlay margin under the gum than a nicely finished gold band. I think we will admit there is a choice.

I am finding satisfaction in putting into many teeth where, previous to the advent of the cast gold inlay I felt it desirable to use gold crowns, gold inlays that are almost gold crowns, except that they are not provided with bands. I have been able to replace several ill-fitting crowns with others made on the inlay principle.

In making gold inlays of any size, we are getting a great deal of satisfaction in my office, out of the use of this Roach suction wax carver. With this the workman readily removes the wax from the centre of the inlay.

I will send around a hollowed wax form of an inlay mounted on its sprue. In all such cases as that large inlay, which is more like a crown than an inlay, a great deal of the wax is taken away before the inlay is cast, so as to lighten it and save gold and make it more satisfactory in every way.

I will also pass around some ivory teeth with inlays in them. This one is a double compound inlay, made in two sections. One side is made, and then the other. I have had occasion to do that several times, sometimes in that same way, and sometimes by making the first inlay with a broader occlusal surface, and then cutting the second occlusal anchorage directly into the gold.

With regard to material, there has been considerable discussion. Many men prefer a platinized gold. Personally, I still get quite as much satisfaction from my 24-carat gold inlays, although I some times use the platinized gold. I have not found what I hear spoken of by some operators, that the gold is unduly soft. Its homogeneousness seems to make up for the difference in hardness, due to the instrumentation in making the foil filling. That is a question for each man to settle for himself.

I see one smiling face in the back of the room, and I know its owner wants me to give him an opening for the choice between the direct and the impression method, because he finds the same satisfaction from the direct method that I do from the impression.

As I said at the beginning, I do not intend to be dogmatic on that point. For myself, I get better satisfaction from the impression method, for two of three reasons: First, it is more convenient in my office to work that way, and then, it is quite possible to have something go wrong in the casting process in the laboratory. If anything does go wrong working by the direct method, unless the precaution and the time have been taken to make more than one wax duplicate in the cavity, one is in difficulty, and must go back to the patient and confess failure. Following the impression method the laboratory man may make a dozen inlays, without the necessity of such confession, and those confessions do not strengthen one's position with his patient. That again is a matter of personal equation to some degree. The man who has begun in the other way and has worked that way with care and has done his own casting, knows just about what he can expect, and will less often have such an accident happen.

There is a place in which it seems to me the direct method is really less adaptable and less efficient. That would be the type of case presented by the second bicuspid in the case passed around—one where there is a double compound inlay to be made; not much tooth left, and a desire for conserving what there is.

There may be a difference of opinion concerning the wisdom of retaining such a shape in a bicuspid; but when the tooth structure is protected in the way we are able to protect it, with a properly constructed and cemented inlay, I have yet to find any reason which contraindicate such procedure in my own practice.

Of course, the advocate of the direct method will say always that there are fewer chances of error—that we get a more accurate fit of the inlay from the direct method. In theory I think that is undoubtedly true; in practice, I think it is true in some instances. I think it becomes less and less true as the mechanical difficulties increase in the individual cavity. The more difficult the shape, the more the cavity extends under the gum in mouths with a profuse flow of saliva not readily controllable—the more doubt whether the chance of error is not greater with the direct method.

There is another point to be considered there. Until we have a more accurate investment material than we have at the present time, I question the value of the claimed difference in

accuracy. Unless Dr. Price is able to show us conclusively next week at the Second District meeting, that his investment material is practicable and accurate—the advocates of the direct process will not for a long time admit that point. If Dr. Price is able next week to make a conclusive showing in that respect, and other men can duplicate the results he describes, the impression method will receive great impetus. On the other hand, if Dr. Marcus Ward, of Ann Arbor, is able to reduce his formula for producing investment materials to such a status that it can be placed before us in a commercial way and be reliable, then the direct method will receive impetus. Outside the work of those two men, I have seen nothing that seemed to me hopeful regarding progress in investment material, and until investment materials are improved, I question very much the practical value of those inaccuracies that grow out of the steps taken in the impression method.

I have brought a mouth mirror and explorer, and afterwards I will ask Dr. Heckard to let us see if that inlay fits.

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## THE PERSONAL EQUATION IN DENTISTRY.\*

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BY NORMAN B. NESBETT, D.M.D., NEW BEDFORD, MASS.

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Believing that often a certain factor has contributed towards the success or failure of our operations, and has a greater influence than many of us suspect, I present this paper with the hope that it will enable us to recognize this factor and devise means to minimize its influence.

Into no other profession or labor in which man is engaged does the personal equation enter more strongly than it does in Dentistry.

Not even in general surgery is it such a factor, for your surgeon to-day performs even a minor operation in the presence of nurses and one or more of his fellow surgeons. Any error that he might make is usually corrected on the spot by his watchful assistants, and the error, forgetfulness, or, if you please, the personal equation, that might have entered and made a failure out of an otherwise successful operation, is avoided.

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\*Read before the Harvard Odontological Society, January 20, 1910.

On the other hand, in a dental operation nearly, if not quite all, is left to one man—if he forgets, if he makes mistakes, no one reminds him, no one sees him. It is true that the patient often comes back in the future to remind him, but that is another story.

To this factor, this personal equation, so little spoken of and often utterly ignored, is accounted much of the vast difference in dental operators. A difference that will always exist to some extent, as long as our work is so largely a personal sum of a pair of skillful hands, plus a pair of good eyes, multiplied by as much accurate dental information as we can acquire.

Let me cite a few cases of how the personal equation can effect our results. We will picture an upper bicuspid already holding a large gold filling at the mesial extending well into the coronal, with a cavity equally large to be filled at the distal. The patient presents for a three o'clock appointment on an afternoon in early winter. The light is bad, and to make it worse, it is a rainy day. Even under those conditions, with the aid of a strong electric light, the operator might be able to place a very good filling, but he has had a very busy day; the light was none too good, even in the morning; he is a human being and not a machine, and he fails to make an absolutely tight joint at the disto-lingual margin. The leak resulting is not detected, the bicuspid being neatly split some day when the patient bites on something unusually hard—and the personal equation has stepped in. Possibly you will say you would have not placed a foil filling there; you would have used a gold inlay. Very well—same conditions—same afternoon— same poor light. The operator moulds his impression wax to the cavity, and removes it, as he thinks, and as far as he can see and feel, in perfect condition. But he could have done better in the morning when he was fresh, so the cervical margin of that wax is not quite perfect, and the inlay is made and set without the defect being noticed. Washing out of cement and leakage takes place at cervix, and same splitting of bicuspid occurs. Personal equation alone to blame, for the operator could have made a perfect operation if the light had been good and his eyes had not been tired and overstrained.

In the treatment of root canals, an operation demanding much of our time to-day, the personal factor again steps in. So much am I a believer in this, that I claim no operator should



ever attempt the thorough cleaning or filling of the difficult canals in the molars and bicuspid, when he feels over-tired or when he is unable to see as clearly as he could at some subsequent sitting. Many failures in such cases have come not at all from lack of skill or technique on the part of the operator, but solely because he attempted the operation at the wrong time; or better, what was for him, the wrong time. It is true that we cannot always have success in the treatment of root canals, but any operator can raise his percentage of successes if he will deem this factor important enough for consideration. If there is any man present who has tried his best to clean the buccal canals of an upper second molar or the mesial canals of a lower molar; felt that he has not reached the end of the canals, and has given up then and there without trying those roots at another sitting, preferably the first in the morning—it is safe to say that man will never know complete success, nor will his patients ever call him a genius. Longfellow has defined genius as “an infinite capacity for taking pains,” and it is the “taking pains” that surely counts in the greater percentage of our work. We will always be judged by the results we *attain*—not by what we might have done if everything had been just as we wished it.

Granting that the personal factor has much to do with the success or failure of our operations, what are we to do to make our efforts as nearly uniformly successful as possible?

To begin with, each one of us can do about so much work per day, varying largely with the bodily health, strength and nerve force of the individual operator. Let any one exceed that, and he does so at the expense of his operations done at that time, and possibly the next day. At first the period of rest and recuperation will be enough between days to enable the operator to keep up the pace, but as times goes on—as the human machine gets older—the short periods of rest between days will not be sufficient and there comes the day when the operator has to start the morning in a thoroughly tired condition, and in no condition to do his *best* in each case as it presents itself. It behooves every operator who cares for *quality* of results and not for *quantity*, to carefully watch himself and see to it that he does not call upon his reserve vitality too long or too often. He should set aside the number of hours per day he can work and not get over-tired, and, barring necessary emergencies, not work more than

that number. He will always be *called* upon to do so—to take on more and more—but if he will set a limit, and hold to it, I think that he will find he has really *accomplished* more at the end of the year than if he follows the plan of crowding more than he can safely do, into each day. And right here, gentlemen, I think I can predict that each one of us will have to do his level best to keep himself in trim for the rush of patients that is surely coming the next two or three years. Through the press of the nation and lectures in public schools the public has become enlightened on the necessity of the care of the teeth, and the people have been awakened to the appreciation of the value of their dental organs in relation to their general health, comfort and happiness. Already this is bringing the people faster and oftener to the dentist's office—and coming as they do with a better appreciation of their own needs and those of their children, they are demanding better dental service and are going to demand it more in the future than they are now. If the people who might and ought to have dental services began to demand it, the dentists in practice to-day could not begin to fill the demand, and surely we know that the dental schools at present are not turning out enough men to meet it. In a few years it is to be hoped that men competent to shine in our profession will see the advantages that it offers, and that many such will graduate from our schools. But for the next few years at least, we men now in practice will have to bear the burden of the public on-rush in the cause of good teeth. So let us take on no more than we can do *well* for each day.

Some men there are who never have time for a vacation—no successful man ever *has* time—he has to *take* time. And the dentist who takes a well-earned rest at some time each year, will, in the long run, both in quality of work and quantity of output, outstrip the one who is too busy to ever think of vacations.

Next in line of importance is system in the office. The elimination of every petty annoyance that tends to take up an operator's time and decrease his efficiency, will do much towards uniformity of operations. The acquisition of a well-trained assistant is one of the best steps in that direction. In the practice of to-day, an assistant is not a luxury—she is a necessity. Many a practitioner thinks he can get along just as well without one; but never have I known many men to run an office without one after once having one. Many an operator's temper, to say noth-

ing of the patient's, has been sorely tried by his having to stop several times during an important operation and attend to such trivial matters as the telephone, expressman's or postman's calls, book agents and the like. And what operator can help feeling ruffled when he has an allotted time for an operation, and finds the time half gone and the operation not yet half finished? Some of us *might* try to hurry the operation under those conditions, but do we do it any better than we might? I think not. But with an assistant to attend to such matters as mentioned, we can concentrate our attention on the case at hand, and finish it to our credit in the allotted time.

We should insist on our patients keeping their appointments on time—and incidentally keep ours on time, also. If we have allotted an hour for a piece of work and know it will take that time to do it properly, and our patient is a half-hour late, we may do something else for him if we like, but we should not attempt the impossible—that is, to do a perfect operation in half the time we know it will take to do it right. Tell him he is late and that he must come again for that particular piece of work, for we cannot do it right in such a short time. If he is a patient worth keeping, he will understand that we do it for his good, and will come again as we suggest. If he isn't a good patient, we don't want him anyhow.

Many operators are trying to do good work in offices that are utterly lacking in the important requirements of ventilation and light. A dentist has to spend the greater part of his working day with his body in a cramped, unnatural position, and the ventilation of his office should be of the best that he may not want for the proper amount of oxygen. I am told by traveling men from the dental supply houses that many dental offices are lacking as to proper ventilation—as one man expressed it—"some of the offices feel and smell as if they had not been aired out for a year!" I have had patients tell me the same thing, and I have been into offices myself where there was such a lack of fresh air that I was glad to get out as quickly as I could, with a profound pity for any man who had to work in such an atmosphere.

As to light, I think many dentists are equally careless. In the smoky atmosphere of most of our large cities no light is any too good. Yet we find dentists laboring day after day in front of

a small window, facing east, west or south, apparently paying little regard as to what *kind* of light they have. The selection of a good *location* for their offices seems to be of more importance to them than the selection of an operating room where a good north light may be had. All other conditions being equal, the man who can work an hour longer in the afternoon without resorting to artificial light is going to do more and better work, and is going to feel better at the end of the year than the man who has to resort to an electric light every dark afternoon in order to finish his day's operating. The public is ever going to judge us by what we *do*, not by where we are located when we do it, and if we do our work well, location will be of little account. It would be well for dentists to bear that in mind when choosing an office and not sacrifice a good light for sake of good location.

Many mechanical devices and processes have come to the front to aid the profession in eliminating part, at least, of the personal equation. Of the mechanical devices, the improved operating chair and the electric engine have probably done the most to lessen operating fatigue. Of processes, the inlay, both porcelain and gold, has surely resulted in a more uniform and careful preparation of cavities than formerly obtained. If the personal error creeps into the process of making an inlay, it is evident that it can be more easily detected and remedied, than in fillings done by another method.

And in the near future, the writer is optimistic enough to believe that many new appliances and processes will be forthcoming to aid us in eliminating the personal equation, and attaining the ideal that must be in the mind of every conscientious operator.

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### MISTAKES.\*

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BY CHARLES T. WARNER, D.M.D., BOSTON, MASS.

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One of our popular evening papers run a series of cartoons headed "Never Again," in which the hero or victim (the terms are often interchangeable) meets with various misadventures and always ends by raising his left hand and making the above declaration. All men are vain and King Solomon says, "All men are liars." We like to tell about our successes in public, but we dream about our failures when we are alone at night. From

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\*Read before the Harvard Odontological Society, January 20, 1910.



which do we learn the most? Speaking in the first person singular, I would say the failures and although my name is *not* George, I will do it and tell of a few.

When I put in my first gold filling as a student at school I would not believe the instructor when he told us that undercuts were necessary, especially as the patient said it hurt and objected strenuously. When she came in the next day with the filling in a paper, trouble in her eye, and told the whole room her opinion of me as a dentist in good West End English, I was glad it did hurt, was only sorry it did not hurt more, and quite agreed with the instructor that undercuts are desirable.

And so I submit this paper not primarily because I claim to be an expert on the subject, for I am far, far too modest for that, but chiefly for the discussion I hope it will produce.

After graduating, one bad blunder I made was in taking all my impressions for partial cases in composition, for the very simple reason that I did not know how, having never been instructed, to use plaster. To this day there are instructors at the school who will argue for this same practice. Thanks to the coaching of some of my good friends I am now able to get an accurate model to work from, and if there are any of you who do not know the pleasure that that implies, I advise you to try it and you will say with me "never again" for the composition.

A cause of chagrin within the last few years has been my inability to get the results that other men claim for two of the popular modern filling materials, gold inlays and silicate cements. Many men I have learned, by personal conversation and by their writing, have practically given up the old-fashioned plugged gold filling as being obsolete on account of the excessive nervous strain to both the patient and operator.

An inlay has always seemed mechanically wrong except in certain adaptable cases where it could be properly seated and the force of mastication would not dislodge it, but tend to drive it more firmly to place. During the past summer it was my good fortune to have referred to me a lady from New York who was spending the summer at the North Shore, and who is the patient of a famous devotee of gold inlays. This lady brought in an inlay to be reset. A few days later she sent in a friend with the same trouble, and subsequently no less than six appeared, all with the same failing and all patients of the same man. Yet

this man has publicly stated that he never had a gold inlay come out.

Am I the only person who occasionally puts in such a good looking silicate filling in a bicuspid or molar that the patient, after looking in the glass, wants to know which tooth has been filled? And am I the only person who has that same filling come back in six months black as your hat, chipped at the edges, or perhaps broken in two? If I am not, you will probably say with me "never again" where the cavity includes the grinding surface.

One of the greatest sources of trouble to the dentist, I believe, is in the treatment of pulp. There are three general ways of treatment, and examples of mistakes may be helpful.

First. Cocaine, which some men tell me is so successful that they use nothing else, and have thrown their arsenic bottle away. But what would they do in a case like this. A girl with an aching upper bicuspid. A large cavity extended to the pulp and when the exposure was touched with a broach she gave a realistic imitation of Wilbur Wright. Cocaine was used under pressure, and the pulp removed, when it was discovered that the girl was slightly mistaken in her sensation, for it was putrescent for half its length. She went home happy, but her happiness was short lived, for I found her waiting for me the next morning a wreck from a sleepless night, caused by pain. All remedies tried were useless until we appealed to the court of last resort—the forceps. The mistake? I had simply carried the infection through the end of the root with the cocaine and started an abscess.

Next we have arsenous acid, and that has its disadvantages as this case will show. A cavity extending to the pulp in the grinding surface of a molar and a mesial filling in the same tooth. I left the filling in place to aid in sealing the arsenic and told the man to come in if he had pain. He came. There was redecay at the cervical of the old filling, and the arsenic leaked out on the gum, causing a slough. Never again do I trust old fillings in similar cases.

Lastly, we have the system of mummification. The theory is very simple, for why try to remove pulp from crooked canals when they can be tanned and made a better filling material than anything we can insert? A few years ago, like some of the rest of you, I bought a preparation, which for short we will

call "Dr. Munyan's Magic Mummifier." It works on precisely the same principle used by the old Egyptians, but I find it has this radical difference: that whereas the Egyptian mummie stay quietly and decently dead, the modern ones in the course of time will kick the cover off from their coffin and behave in a very indecorous manner.

There is another mistake to which we are all prone, and that is to the things we say to our patients, and especially, in that matter of the gentle art of wielding the hammer. How easy it is when a patient comes in with a mouth full of poor fillings to take a crack at Dr. Jones, who put them in—especially if we are not on any too friendly terms with Dr. Jones. But when we have tried to work for that self-same patient we are often obliged to mentally apologize to Dr. Jones and congratulate him on his great skill in being able to do anything for her.

Dr. Brackett has so well expressed himself in regard to this matter of our saying that I want to repeat it:

"The dentist should be very careful in all his expressions concerning others. Never let it be said that your office is a good place to get the news. Seldom introduce a personal topic of conversation, and then only to comment something which is good and worthy. Ascribe to others good intent and right motives; make allowances for mistakes, misunderstandings and misapprehension. Do not mind trifles. Cultivate a broad-mindedness and a high-mindedness. With the right spirit in us we shall find but most rarely in the work of any other practitioner anything to condemn or even to pass over in silence; but we shall find all along the way multitudes of instances for commendation.

Some of our patients come to us to have a tooth filled. Undivided diligence in filling the tooth is what is desired. Above all, do not burden others with any of your own cares or trials. Before you say anything question if saying it will serve any good and useful purpose or make anybody really wiser, better or happier. No one is benefited by having you retail that you did not sleep last night, or that mosquitoes have bitten you, or that you have dyspepsia, or that the cook has left and the plumber did not come. First, do not have troubles; second, when you have troubles, do not mind them; third, when you mind them, do not talk about them."

With equal earnestness I would say that we should be ever

ready to listen to the troubles of others, and alert to be as helpful as we can to every one who is really in need of such cheer and comfort as we can give.

A lamentable case of inconsiderate cruelty of expression was under these circumstances. A skilled and careful dental practitioner had been nursing along for some time a case of disease of the mouth, which he recognized as malignant. The patient was very ill, but neither he nor any of his friends had knowledge of the grave significance of his malady. If I remember rightly, the patient's wife was of an hysterical temperament, and a victim of heart disease, which made anything of a mental shock a great risk to her. One day when the patient and his wife were in the office, the attending practitioner had a call from another dentist whom he politely asked to see the case. At the first glance the visitor blurted out, in a voice to be heard through consulting and waiting rooms: "Well, I don't know what you think about it, but I think it is a cancer." The drop had fallen, and the harm done by the inconsiderate expression could never be repaired.

To offset this I give you some more kindly instances. A gentleman, now past eighty years of age, has for a long time at annual examinations pointed out a buccal filling in a right lower second molar as having been made when he was twenty-six. Really, his present dentist refilled the cavity a few years ago, but he is quite content that the old-time service shall have the credit.

Nothing in the way of faith could be more implicit than one elderly lady's confidence in mutton tallow as a panacea for every sort of toothache. In her case the most intense odontalgic yields at once to free application upon the gum. Some of her friends have hard work to accept and use her remedy, but her dental advisor expresses only rejoicing that she has such a ready and effective resource.

In the beginning of my practice an esteemable old lady, long since of blessed memory, came in wearing a partial lower plate with two ordinary porcelain central incisors attached. She told me of her long-cherished and deep-seated repugnance to wearing artificial teeth, and of how, when her own teeth had dropped out, her dentist had mounted them on the plate, and she had such satisfaction in wearing them. He would have been a black-hearted



wretch who could have destroyed the sweet illusion. You will note that the writer draws a line of distinction between wilfully deceiving and permitting others to hold opinions to which they are entitled. Their opinion may be a mistake, but if they are happy in it, may it not be possible to make a mistake by correcting a mistake?

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### WHAT TO DO AND HOW TO DO IT.\*

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BY W. A. WHITE, D. D. S., PHELPS, N. Y.

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Tradition instructs us that the Jews stood for religion, the Greeks for culture, and the Romans for law and organization. We as citizens of the United States stand for and advocate every symbol accredited to these three nations, and regard these attributes as the foundation upon which our republic was builded, and upon which it will always stand. With these sentiments before us as a guide ever since the Mayflower grazed our eastern shore, the mind of man has been directed by law and organization, and from which has emanated that progressive spirit, which is today the chief characteristic of the American citizens, imbued with that spirit of progression, both the American scientist, jurist and dentist lead their respective professions of the world.

This is an age of education and progression. The innermost recesses of the human mind are daily being traversed, through the channels of science, art and mechanics. Scientific research has revealed many new, as well as prehistoric arts. No branch of science has developed and yielded greater results that have benefited mankind than those found in the various departments of our own profession, and the subject now under consideration "Oral-Hygiene" presents a broad field for study and investigation.

In scanning this field our eyes and mind are not centered upon any one section, it includes the north, east, south and west, so that our personal efforts may be confined within the scope of our own location, and at the same time our influence used in an effort to herald the forward movement beyond the borders of our own clime. To mention the innumerable physiological disturbances caused by diseased dental organs, largely due to the lack

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\*Read before The New York Institute of Stomatology, February 1, 1910.

of early education, would require more time and space than is at my command, but to mention the fact that Dr. Netter a noted physician upon microscopical investigation finds the diplococcus of pneumonia in mouths of about fifteen per cent. of healthy individuals, as also the bacillus of typhoid and diphtheria, and the micro-organisms of thrush, erysipelas and anthrax is sufficient for us as a profession to deem it incumbent upon us both collectively and individually to advocate at the chair, in our homes, in the school, and to the community at large the necessity as a means of prevention of disease, the study of, and the daily practice of "mouth" or oral hygiene.

With the advancement in medical science it is worthy of note that the education of the student of medicine today, is taught that much of his success depends on the recognition and the enforcement of thorough sanitary and hygienic law. This conclusion is based upon statistical data reported by the most prominent medical associations both in this country and abroad, as well as by the department of health of your own city. This being the case, the success of our efforts depends not on what we may do, say or think, in such meetings as this, but what can be accomplished through education of the common people. Can this be accomplished through any better medium than the education of the children, and can the children be taught the benefits derived from oral hygiene in a more forceful manner than by the establishment of Dental Clinics in our public schools, and included in the curriculum of their daily studies? These are questions for us to consider here tonight.

The necessity for early instruction in the care of the teeth is becoming more and more apparent every day. As the results of sanitation are studied and developed, and with this education the parent is recognizing the necessity and benefits derived in properly caring for the teeth of the child, and at the same time acquainting themselves with the fact that not only the normal development of both the mental and physical being, as well as the future health of the child, which wholly and alone depends on proper and normal assimilation of the life giving elements, which can be accomplished only by thorough and proper mastication of their food, and this in turn can be accomplished only when we find a healthy mouth and perfect dental organs. It has been truly said by Dr. Paul Gardner White that "The oral cavity is the main

gateway to the entire body, and it is through this gateway that many destructive diseases find entrance, originating from infectious material in the mouth," and he speaks the truth when he also states, "that the mouth under the most favorable circumstances is an ideal incubator for the development of many forms of bacteria, and that bacteria, both pathogenic and non-pathogenic are present therein at all times." It is a well known fact that these bacteria require certain conditions to insure propagation, such as suitable food, moisture and temperature and a removal of their waste products to prevent their own destruction, all of which are present in the oral cavity. With these existing conditions, where ordinary care is given the mouth and teeth, what can we expect to find where the use of either brush or dentrifice is unknown, particularly among the children of our public schools, and especially where innumerable decayed and ulcerated teeth are present, which furnish receptacles for the accumulation of food and decomposition, which combined with swollen and diseased gums, vitiates the secretions of the oral cavity, and make both proper mastication and normal assimilation an impossibility, thus causing the great workshop of our being, the stomach, to become deranged and the various organs and tissues improperly nourished, indigestion the primary cause of many functional disturbances follow, and then we wonder what is the trouble. If the generator is defective and out of order how can the electrician expect to produce a satisfactory degree of power and light, so I ask how can the child with defective dental organs properly masticate its food, and be properly nourished? Speaking of the stomach and its relation to perfect health, a prominent writer says, "The stomach may be compared to a stove, the food to the fuel consumed by the stove, and life to the heat given off by the glowing coals." So as the heater demands proper fuel and care to regulate and maintain the temperature of our homes, so does our stomach require proper food, properly masticated and properly assimilated to enable it to furnish the vital glow, so necessary to perfect health, and to meet this demand the food taken into the stomach must be thoroughly masticated and mixed with healthy saliva and not contaminated with vitiated secretions. "Good health demands thorough digestion, thorough digestion demands thorough mastication and thorough mastication demands perfect sound healthy

teeth." The common results of decayed, broken-down and ulcerated teeth, inflamed and diseased gums, with their general accompanying conditions are too well known to you all, for me to dwell at any length on this phase of the question which we are studying. You have on previous occasions listened to exhaustive papers on the cause and effect of disease attributed to lack of proper dental attention, all of which has been presented in a thoroughly scientific manner, and furnished both listener and reader much thought and food for study and reflection on a subject which is both demanding and receiving the most pronounced attention by both civic, educational and professional bodies. I know of no subject that is worthy of greater attention than oral hygiene, for I thoroughly believe that with the education of the children, our future citizens, on whom will depend the growth, health, strength, and future prosperity of our country, many of the prevailing diseases of the present generation will be wholly eradicated. This brings us now to the question of what is best to do, and how to do it. I am of the opinion that education is the only basis upon which oral hygiene can be thoroughly appreciated and its beneficial results realized. As the public today are being educated how to eradicate the "Great White Plague," tuberculosis, which is being brought before the public mind through tuberculosis exhibits in connection with educational, and even Granger Conventions, where its cause, effect and results are explained and demonstrated by those familiar with this dread disease, the public are being educated and instructed to such an extent that there is hardly a hamlet within our State that has not an Anti-Tuberculosis organization. This has been accomplished by the medical profession keeping in touch with the public through Anti-Tuberculosis literature, lectures and constant agitation of the question, until hardly a child of school age is not familiar with the disease and its fatal results so I believe what education is doing with the view of eliminating this disease from our midst, so I believe with proper education "Oral-Hygiene" will, when understood, revolutionize not only the practice of dentistry, but change the whole characteristic being of the coming generation. It will produce health, strength and beauty, where now exists low vitality, disease and mental defect. Teach the child Oral Hygiene and you will keep him growing healthy, answer all his questions, and you need not worry about his mental development. Dr. Wood Hutchinson



says, "The correlation between mind and muscle is obvious in the earlier days of life. The first test of muscular vigor, the hand grasp is an indication of the mental possibilities as well. Not one child out of a hundred who at ten days of age grasps firmly and clings to a finger or pencil rubbed against his pink little palm will ever fall below the average intelligence of his race." This is education. The baby does not learn to walk—he grows to walk. You could no more stop him from acquiring this accomplishment under anything like healthful conditions than you could keep him from growing taller. With the natural instinct of the child to be governed by, and acquire habits adjusted and regulated by his environments so will his mental and physical development conform to his early instructions regarding hygienic law, therefore I advocate in connection with the study of physiology, thorough instruction in our public schools on Oral Hygiene.

As an evidence of this, Dr. Paul Gardner White truly says, "Nowhere do human beings congregate more closely and constantly than in the school room, and nowhere can contagious diseases be more easily propagated, while it is compulsory that the child's face, hands and apparel be clean, and that the light and air of the school room be regulated in accordance with sanitary law, the fact is utterly disregarded that a single unclean mouth, despite all superficial precautions may vitiate the atmosphere of a school room and become a fruitful source of disease." Can you suggest a more important place for instruction and education on the importance of a clean mouth and teeth than the school room? Here we find the virgin soil ready to receive the seed of instruction, and with proper cultivation will be productive of results that will not only change the environments and atmosphere of our houses of learning, but it will also penetrate and permeate the humble home as well as the church and palace. It will open up a new avenue of instruction that will develop and broaden the mind of the student along a line of thought that will bring them to the realizing sense of what proper sanitary precaution means to their future well-being, with compulsory education in Oral Hygiene, brighter minds, keener intellects, better developed and more properly nourished progeny will make up the ranks of the future generation. Our first conception of this question must be based upon its importance, and to what extent it is associated with us as dentists. Its importance is beyond question one of the

gravest that has confronted us for years, and one that will involve concerted action on the part of every dental organization in the State and nation if the anticipation and hopes of those who are agitating its enforcement is realized. The success of such a work is dependent on the co-operation of both our local and State organizations. We have an oral hygiene committee of the National Dental Association, whose efforts along this line have received but little encouragement by those in authority. You are aware that in this State, compulsory examination of the eyes, is exacted by the Board of Regents, who furnish the proper instructions to the teacher for such examination, with an authorized blank giving the record of his child's age, distant vision, focusing power, eyes inflamed, discharging or squinting, lids inflamed, scaly or swollen, eyes pain or fatigued after using, headache, daily or weekly, and at the same time the ears are subject to as concise an examination. The teacher then fills out a blank and sends to the parent as follows: "An examination of your son or daughter shows the eyes, ears, nose or throat to be defective and below the standard. Your child cannot do satisfactory work in school until this defect is corrected. You should consult with your family physician, or with the health officers of your city as to choice of an ear or eye doctor whom you are advised to consult about the trouble." This same child may be suffering from the effects of decayed and ulcerated teeth, which may at the same time be the direct cause of a defective condition of any or all of the above mentioned organs which are subject to a compulsory examination, while the dental organs are left to take care of themselves. Can you conceive of anything connected with our State school law that is of more importance than the addition of compulsory education in Oral Hygiene which seems to be as little understood and appreciated by those in authority as by the ordinary laymen. While I cannot endorse Dr. Wood Hutchinson, when he publicly states "That the doctors should be in politics, that their duties demand it," his idea may be governed by the well known fact that to insure the successful issue of legislation in the interest of the people, we must keep in close touch with those who make our laws, and I am satisfied that education in oral hygiene will become an established fact, only when it becomes a school law.

Since we lead the world in all sanitary laws, why should this

most important one, "Mouth Sanitation" be neglected, when its importance is so far reaching and means so much to the boy of today who is the man of tomorrow?

If we must, let us follow the example of the "School Children Committee of the British Dental Association" who issued the following rules and circulated them for the information of managers and teachers of the National Schools of Ireland:

1. The teeth should be cleaned once daily.
2. The best time to clean the teeth is after the last meal.
3. A small tooth brush with stiff bristles should be used, brushing up and down and across, inside and outside, in and between the teeth.
4. A simple tooth powder, or a little soap and some precipitated chalk taken up on the brush may be used if the teeth are dirty and stained.

5. It is a good practice to rinse the mouth after each meal.

6. All rough usage of the teeth, such as cracking nuts, biting thread, etc., should be avoided, but the proper use of the teeth in chewing is good for them. (Journal of the British Dental Association.) While these rules are simple and good, but not strict enough, they furnish us evidence that the question of Oral Hygiene, and its importance is receiving attention by our conferees across the water, and when we consider the amount of work that has been done, and the amount of money that has been expended, alone in Germany in establishing free dental clinics as well as the work already accomplished by other foreign nations to instruct their people on the subject of Oral Hygiene, we must soon awaken to the fact that our laurels which have placed the American dentist in the foremost rank of our profession will soon hang in the balance unless we demonstrate by active measures, that we are alive to the importance of this subject, and recognize and adopt measures to arouse not only the members of our profession, but those who are in charge of our educational as well as our eleemosynary institutions to such active work as will insure results that will inaugurate in every public school a thorough course of instruction on oral hygiene and dental prophylaxis. This can be accomplished in no other way than by an effort to enlist the co-operation of every district and State dental organization in the country. While much has already been accomplished by local organizations to meet the demand for general

instruction and education it must come under the head of compulsory education. That the subject is worthy of consideration is demonstrated by the fact, that in the city of New Orleans the committee on Oral Hygiene of the local dental society has been granted by the Board of Education the privilege of delivering a series of lectures on the subject in fifteen of the city schools, while in the city of Cleveland, Ohio, through the efforts of Dr. W. G. Ebersole, chairman of the committee on Oral Hygiene of the National Dental Association, a similar permit has been granted.

If you will pardon the reference, I will at this point refer to the work that has been done and is now being done by the Rochester City Dental Society of which I am a member. There we have a committee of Drs. W. W. Belcher, B. S. Hert, W. W. Smith, R. H. Hofheinz, F. M. Rood, B. F. Lewis and C. A. Howland, men of honor and integrity as well as ability, and under whose direction wonderful results have been obtained, and all because they are sincere and earnest in their work. Their first effort was to interest the Board of Health and lay before them the work which they wished to do and which could only be done with their sanction and co-operation. This was granted, and the privilege of establishing a "Free Dental Clinic" at the Rochester Public Health Association rooms was allowed. The assistance of the late Capt. Henry Lomb, a generous philanthropist was solicited, and he became so interested in the work that he presented the committee with a complete dental outfit. Material was solicited from the manufacturers and the result was the "Free Dental Clinic of Rochester" is one of the best equipped offices in the city. This was in 1905. That year there were 649 operations, in 1906, 2,107; in 1907, 3,211; 1908, 3,900; 1909, 4,908. The patients came from the orphan asylums of every denomination. The various hospitals, Home of the Friendless, Children's Aid Societies, the Society for the Prevention of Cruelty to Children, The Industrial School, The Door of Hope, The Health Association, the Health Bureau, The Tuberculosis Hospital, The Day Camp, every public and parochial school in the city, from ministers, priests, physicians, teachers, dentists and laymen. An effort is made to investigate every case. Many of the children do not need investigation. Their poorly nourished bodies speak for themselves. Thorough instruction in mouth



sanitation is given every patient. The demand for dental services among these charitable people has daily increased so that instead of the clinic being open only three days in the week as at first, it is now kept open every day under the care of a regularly employed dentist, whose salary is paid by voluntary contributions from the public who became acquainted with the clinic and the charitable work being done by means of 10,000 copies of the dispensary report which were issued and distributed by the committee. The citizens of that city through this medium learned of this philanthropic work, and upon investigation by the League of Civic Clubs the results were astounding, and when they ascertained from those in charge at the asylums that since the teeth of their charges had been properly cared for, there had been less sickness, school duties were less arduous, they comprehended their work more easily, and the whole tenor of the child seemed changed. A new era seemed to have dawned, an interest in what seemed to be a new life saving ordinance was inaugurated, and the board of education was consulted and made acquainted with the marvelous results of the work mentioned. The result was, that a room in school No. 14 was assigned to the committee and at the expense of the city such changes as were suggested by the committee to make it suitable for a dental clinic were made. Again the committee appealed to the manufacturers of dental furnishings with the following results:

From Alling & Corey, Examination Cards.

Dr. Booth, Canandaigua, Sterilizer.....	\$ 8.00
Lambert Pharmacal Co., St. Louis, Mo., Dentrifices and Booklets.	
Eckfield & Dubois, Phila., Amalgam.....	6.00
S. S. White Dental Mfg. Co., Phila., Materials.....	50.00
Webster Dental Co., Buffalo.....	25.00
Buffalo Dental Mfg. Co., Buffalo, Hot Water Heater...	25.00
Ritter Dental Mfg. Co., Chair \$225.00, Engine \$140.00..	365.00
Electric Dental Mfg. Co., Phila., Switch Board and Elec- tric Air Compressor and Equipment.....	200.00
Lee Smith Sons Co., Pittsburg, Cabinet.....	165.00
Consolidated Dental Mfg. Co., Bracket and Table.....	25.00
A. C. Clark & Co., Spittoon.....	60.00
Lukens & Whittington, Phila., Instruments.....	25.00
W. V. B. Ames, Chicago, Cement.....	25.00

J. W. Ivory, Phila., Instruments.....	25.00
C. Ash & Sons, N. Y., Instruments.....	24.00
Pelton & Crane, Detroit, Suspended Light.....	15.00
John Hood Co., Boston, Amalgam.....	15.00
Ontodographic Mfg. Co., Amalgam.....	15.00
Mrs. Ambrose Lawrence, Boston, Amalgam.....	25.00
The W. M. Sharp Co., Phila, Mouth Mirrors.....	15.00
Dentinol & Prroicide Co., Medicine and Instruments....	25.00
New England Water Supply Co., Paper Cups and Con- tainers .....	9.00

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\$1,147.00

This list is being added to daily and I think the contributions of materials and furnishings will total nearly \$1,500.00 before they are ready to get busy with the new work which will be within ten days.

Dr. Belcher, chairman of the committee says, "It has not been difficult to get these things—it has been a case of ask and ye shall receive," but at the same time it represents some hard work.

Can we as dentists engage in a more philanthropic or humanitarian work than to organize for just such work as has been done and is being done by this society? This demonstrates what can be done when we know "what is best to do and how to do it." All the work accomplished by this committee is due to education of the public in the city of Rochester where I believe has been established the first "Free Dental Clinic" in this country directly connected with a public school.

Every true life has a permanent purpose. It has some goal which it hopes to reach.

(a) Columbus saw a great continent beyond the ocean and through unnumbered difficulties he steadfastly set his face until he reached it, and on his knees in the name of God he planted the Cross of Christ upon San Salvador. That was his goal.

(b) George Washington saw a great republic beyond the colonies and through personal discomfort and privation, through battles and victories and defeats, through misunderstandings and despairings he steadfastly set his face until it was accomplished. That was his goal.

(c) Abraham Lincoln saw a great army of men and women in bondage worse than death. He heard the groans of slaves

and was impressed with man's inhumanity to man. When a young man in the city of New Orleans he saw a family of slaves sold like any other commodity and he said to himself, "If ever I get the chance to hit this thing I will hit it hard." He steadfastly set his face to accomplish it until he signs his name to the Emancipation Proclamation. That was his goal.

(d) David Livingston as a young man was a weaver sitting on the loom casting back and forth the commonplace shuttle, but through the moving meshes of the web, he saw the dark continent of Africa with its one hundred and fifty millions of men crushed in ignorance. He came down from his loom and steadfastly set his face toward the dark continent. For years he tramped through the forests and on his knees died praying that God might heal this open sore of the world. That was his goal.

And have you not known men deeply engaged in business or their profession who definitely confined their business or profession to certain hours and gave the other hours as well as much of their wealth and influence to the support of some mission school, or hospital or refuge for the earth's unfortunates and kept at it steadfastly through their years. That was their goal.

Now it may be well emphasized that before every one of us the vision of some goal has appeared. Not, indeed, the same to all men, nor the same to men at all times. Only once could Columbus discover one continent, and a Livingston explore the other. There are some things done forever, here and there men could stand and say, "This is finished." Our goal is in sight, which is the education of the children in Oral Hygiene, and let us work until we can stand and say it is finished. This time will never come until every mother in the land can properly instruct and educate her child in the proper care of the dental organs. No word picture more beautifully portrays this than the words of Daniel Webster, when he addressed an assembly of ladies, and said, "It is by the promulgation of sound morals in the community, and more essentially by the training and instruction of the young, that woman performs her part toward the preservation of a free government. It is generally admitted that public liberty and the perpetuity of a free constitution rest on the virtue and intelligence of the community which enjoys it. How is that virtue to be inspired, and how is that intelligence to be communicated? Bonaparte once asked Mme. de Stael in what manner

he could best promote the happiness of France. Her reply was full of political wisdom. She said, "Instruct the mothers of the French people." Mothers are, indeed, the affectionate and effective teachers of the human race. The mother begins her process of training with the infant in her arms. It is she who directs, so to speak, its first mental and spiritual pulsations. She conducts it along the impressible years of childhood and youth, and hopes to deliver it to the stern conflicts and tumultuous scenes of life, armed by those good principles which her child has received from maternal care and love.

If we draw within the circle of our contemplation the mothers of a civilized nation, what do we see? We behold so many artificers working, not on frail and perishable matter, but on the immortal mind, molding and fashioning beings who are to exist forever. We applaud the artist whose skill and genius present the mimic man upon the canvas; we admire and celebrate the sculptor who works out that same image in enduring marble; but how insignificant are these achievements, though the highest and fairest in all the departments of art, in comparison with the great vocation of human mothers. They work, not upon the canvas that shall perish, or the marble that shall crumble into dust, but upon mind, upon spirit, which is to last forever, and which is to bear, for good or evil, throughout its duration, the impress of a mother's plastic hand."

I believe that the future holds great possibilities for the dental profession, that its duty of preserving and promoting the public health will make it one of the greatest public forces, if we but use our best effort to encourage and foster the teachings which we advocate. The influence of such work cannot die, but will go on and on for years to come, as a rich inheritance for those who follow.



FROM THE RESEARCH DEPARTMENT, HARVARD  
DENTAL SCHOOL.\*ANTAGONISTIC THERAPY: ITS LABORATORY ASPECTS AND ITS  
APPLICATION IN SEPTIC PROCESSES OF THE ORAL CAVITY.

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It has long been recognized that the struggle for existence is as active in micro-organic life as in life that is more complex in its nature, and that the law of natural selection plays an important part in the life history of bacteria.

We know that if several kinds of bacteria are planted together in a culture medium, they do not all develop with the same rapidity; one variety usually predominates. And if a series of transplants are made at intervals of a few hours, it is quite possible to obtain a pure culture of some one of them. For example, I have found repeatedly that a culture containing the Klebs-Loeffler bacilli with staphylococci, will show practically no Klebs-Loeffler bacilli in forty-eight to sixty hours if transplanted two or three times. In cases where Klebs-Loeffler bacilli can be demonstrated after such procedure, they are usually of a degenerate type.

It is true that there are many conditions—such as the kind of culture medium employed, its reaction, temperature, etc., that determine which particular species will predominate when a number of micro-organisms are growing together. It is entirely possible, by a change in conditions, for an organism which is the most vigorous in a mixed culture to be outgrown by another variety later.

In the alimentary tract of the human body this fight among the micro-organisms for existence is being waged continually, and perhaps nowhere more vigorously than at the beginning of the digestive tract, in the oral cavity. It is undoubtedly true, also, that both natural selection and antagonism play an important part in keeping the bacteria of the mouth reduced to physiological limits; for, with the exception of an oxidizing enzyme

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which has been carefully studied by McDonald in Carlton Smith's laboratory, there is nothing in the secretions of the mouth so far as we know to inhibit the growth of bacteria.

This principle of antagonism has been applied in the field of therapeutics. Pure cultures of harmless bacteria are introduced into some of the body cavities in order that they may grow and render innocuous pathogenic bacteria present and producing pathological reactions.

I am well aware that in discussing bacterial antagonism and its therapeutic application, I am bringing forward nothing that is entirely new, for Miller more than twenty years ago summed up the results obtained at that time by saying, "this plan of therapeutics has not been accompanied by the results hoped for."

Very little research on the subject, however, has been done since that time until Metchnikoff by his investigations with the *Bacillus Bulgaricus*, a lactic acid producing organism, renewed an interest in the whole subject, and, as a result, stimulated more through research in this phase of bacterial life.

Metchnikoff's opinion that human life is shortened by the absorption of toxins of putrefaction in the large intestine, and that longevity would result if these putrefactions could be prevented has not been universally accepted by medical men. It has, however, been productive of much experimentation, and the results of many of these experiments have pointed rather conclusively to the fact that lactic acid bacteria and their products, do exert a marked inhibitory effect on the putrefactive organisms.

Dr. Goldstone in an article on "Lactic Acid Ferments and Putrefaction" says: "We have two methods at our disposal to combat intestinal intoxication, viz.: (1) by rendering the intestinal area acid, (2) by introducing into the intestine, bacilli directly antagonistic to those which attack the proteids."

He feels that clinical experience has demonstrated the fact that lactic acid bacilli have a definite inhibitory action on putrefactive processes, as well as producing certain changes with which we are not concerned in this paper.

Dr. George Herschell, of London, says: "The effect of acclimatizing the *Bacillus* of Massol in the intestine is to inhibit the growth of the proteolytic microbes which are the most common cause of abnormal putrefaction and consequent auto-intoxication. This has been proved by the great diminution in the

daily excretion of the ethereal sulphates which has been observed, and the alteration in the character of the feces during the process."

The favorable results obtained by the use of the lactic acid organisms in bowel conditions, led to a broader application of the principle of antagonism, until, at the present time, lactic acid bacilli as antagonists are being used in many pathological conditions having bacterial invasion as an exciting or contributory cause, such as leucorrhœa, cystitis, rhinitis, otitis media, conjunctivitis, and other conditions that might be mentioned.

Early last winter when I became interested in antagonism, I reviewed the literature and found the subject was dealt with almost exclusively from the clinical side. And so, with the purpose of investigating the matter from the laboratory standpoint I commenced some experiments at the Pathological Laboratory of the Boston City Hospital. No one is more fully aware than am I, that these experiments are but preliminary steps in the study of the process of antagonism, and that before the value of its therapy can be accepted by all, more thorough study must be made both in the laboratory and clinic, with the results verified by many observers. Nevertheless, a description of the experiments already made, and the deductions that naturally follow may be of interest.

In brief the experiments consisted in

1. Planting cultures of a few of the common pathogenic organisms with cultures of the lactic acid organisms, and observing the growth both in culture itself and in smears.

2. Planting known mixed cultures both with and without the lactic acid bacteria, and watching growth as before.

Before giving detailed results of the experiments, it may be well, perhaps, to give briefly a description of the cultural and morphological characteristics of the lactic acid organism.

You are all aware that there are many varieties of this organism; but in the experiments only two different varieties, or rather two different strains of the same variety were used.

The bacillus *bulgaricus*, described by Massol, is a long, slender, non-motile rod, with marked tendency to chain formation. It takes a Gram positive stain. Spore formation is slight. It forms no gas; grows poorly on agar and blood serum; grows well in sugar bouillon, and best of all in milk. In litmus milk,

acid formation is marked. Coagulation is complete. There is digestion of milk after forty-eight hours. Qualitative test demonstrates the presence of lactic acid, and titration shows about 2.5 per cent. acid reaction, which is not wholly due to the lactic acid.

The other organism used was one recovered from dry cultures in tablet form as recommended by Metchnikoff. This strain, which for convenience, I called acid bacillus of Metchnikoff, is a shorter and much thicker rod than the bacillus of Masol, and forms much shorter chains. It is non-motile and Gram positive; has many end spores and spores free; grows well on agar, in bouillon and milk, and is more rapid in its growth than the other variety. On agar it presents a soft, glistening, raised culture spreading rapidly. Bouillon is cloudy. In milk, acid formation is not so marked. Coagulation and digestion take place in twenty-four hours. Chemical test for lactic acid is positive, and titration shows approximately two per cent. acidity.

Pure cultures of several other varieties of the lactic acid bacillus were isolated, but as they were not used in any of the experiments, it is not necessary to describe them in detail.

As I have just stated, my first group of experiments consisted in planting the lactic acid bacteria with certain of the common pathogenic organisms and noting results.

The first organism used with the lactic acid bacteria was the staphylococcus aureus. A series of twenty-five cultures of this kind were made at various times during six months, plantings being made chiefly in bouillon and agar. In general about three-quarters of the cultures showed an equal growth of both organisms the first day. Of the remaining cultures, four, on the first day, showed a growth in favor of the lactic acid, while in two cases staphylococci predominated. The second day, however, the growth showed a marked drop in cultures where growth of the two groups of bacteria was equal, and a great gain in the cultures where the lactic acid was the more prominent. The third day showed a slight gain in cultures where growth of lactic acid bacteria was the more prominent.

In no case was pigment formed. In ten cases smears showed absolute disappearance of the staphylococci after the third day. In four cases, however, the staphylococci completely outgrew the lactic acid bacteria.

These observations as to comparative growth are inaccurate



in so far as no actual count of the bacteria in cultures or smears were made. From smears, however, a very fair estimate of the relative proportion in which the different organisms were growing could be reached.

The results in a series of twelve cultures of streptococcus and lactic acid cultures showed disappearance of the streptococcus from smears in several cases on the third day. In one case the streptococcus was inhibited but was present infrequently in smears. In four tubes in which at first the streptococcus seemed inhibited, on the third day the lactic acid organism apparently lost its vitality for the streptococcus greatly outgrew the lactic acid organism.

In eight cases of pure pneumococcus with lactic acid started in neutral medium, two cultures showed equal growth on the first day. After that growth was in favor of lactic acid in all cases. Six cases showed disappearance of the pneumococcus in smears on the third day.

Fifteen cultures of the Klebs-Loeffler bacillus and the lactic acid bacillus were planted on blood serum. Eleven tubes showed inhibition of the Klebs-Loeffler on the first day, and on the third, smears showed the Klebs-Loeffler to have disappeared in ten of the tubes. In four tubes, smears on the third day showed the presence of Klebs-Loeffler, but they stained more faintly and polar granules were not so easily seen. In three cultures of Klebs-Loeffler that had a twenty-four hours' growth, several loops of bouillon culture of lactic acid bacteria were added. On the third day the Klebs-Loeffler was still present, but stained more faintly, and after two days more smears showed practically no Klebs-Loeffler.

*Bacillus coli communis* planted with lactic acid bacilli showed quite different results from the foregoing. In the tubes no marked difference in the growth of the two organisms could be detected. Both organisms grew well together, and smears showed equal distribution in all the fields examined. In all cases control tubes were planted for checking results.

The experiments just outlined were all conducted with pure cultures of one particular organism.

A very limited number of mixed infections were also used in experiments. Swabs were obtained from the pharynx of two cases of bronchitis. Smears showed staphylococci, streptococci,

and pneumococci, together with many organisms commonly found in the mouth. Cultures were made in bouillon and on agar in the ordinary way, and another set inoculated with lactic acid bacteria. In twenty-four hours the cultures not inoculated with lactic acid bacteria, showed the streptococcus to be the prominent organism in one, and the pneumococcus in the other. After three days' growth the picture changed so that the staphylococcus was predominant in both. In tubes planted with the lactic acid bacteria, twenty-four hours' growth showed all organisms growing well. After two days, lactic acid bacteria predominated in both tubes, many staphylococci staining faintly or not at all, which indicates inactivity.

Ten cases from pyorrhea pus was used next in experimentation. Smears showed staphylococci, streptococci, pneumococci, coli communis, and in all cases the spirochete refringens—fusi-form bacillus combination. Plants were made in all cases, and after the first day five cases showed the pneumococcus most prominent. In four cases no organism seemed to predominate, but a fair growth was present. In one case the staphylococcus was most luxuriant in growth. In the tubes inoculated with lactic acid, four cases of the five where the pneumococcus predominated, showed practically no pneumococci after the second day; while the staphylococcus persisted in three cases until the third day when it begun to disappear. One case showed apparently no inhibition in growth of pneumococci. In the four cases with no predominant organism, after the second day pus organisms were markedly inhibited, and the third day showed only a few scattered cocci in smears. In the remaining case the staphylococcus persisted, although growth was inhibited after the third day.

In forming any conclusions from the results of the experiments just outlined, one very important point has to be taken into consideration, namely, the degree of virulence and activity of the organisms used in experimentation. Unfortunately we have no simple method of determining the activity of bacteria, but we do know that the same variety of bacteria will vary greatly in its activity or vitality. Furthermore we have the activity of two different classes of bacteria to deal with: the pathogenic organism and the lactic acid bacteria (a non-pathogenic micro-organism) so that a reasonable degree of variation in

results must be expected. It is within the bounds of conservatism, however, to conclude from the total results:

1st. That the lactic acid organism exerts in a large percentage of cases, a marked inhibitory and antagonistic action on common pathogenic organisms such as the staphylococcus, streptococcus, pneumococcus, and Klebs-Loeffler bacillus.

2nd. That the degree of inhibition depends on the virulence of the pathogenic organism, and the activity of the lactic acid organism.

3rd. That the lactic acid organism has little or no effect on the colon bacillus.

One of the first questions naturally arising is what causes the inhibitory action: the bacteria themselves, or the lactic acid that is formed, or some other products of the organism?

Space forbids any exhaustive discussion of this most interesting question. Briefly, however, the findings of Kitasato, who discovered that the bacillus of typhoid fever is killed in five hours by a solution containing 0.4 per cent. of lactic acid, and the cholera spirillum by a 0.3 per cent. solution of the same is very suggestive. Moreover I have found in a small series of experiments, that a one per cent. solution of lactic acid will inhibit and kill the ordinary pus organism in sixteen to forty hours in culture. While undoubtedly there are other factors which have their influence in the process of antagonism, yet it is safe to say that the action of the lactic acid produced by the micro-organism is the most important.

The question as to whether the lactic acid organism will exert as marked an antagonistic action on pathogenic organisms in the body cavities as in laboratory culture, or, in other words, whether antagonistic therapy is of definite value has been answered already to a greater or less extent by North, Goodale and others. Dr. North reports out of three hundred cases of various infective conditions, but eighty-six in which there were no results from the use of lactic acid organisms as an antagonist.

My own experience clinically with the lactic acid organism has been more limited. Three cases of purulent maxillary sinusitis, two of which were complicated by marked ozena, were treated with cultures of lactic acid. The two cases with ozena were greatly improved, the odor disappearing after the second treatment in one case, and the third treatment in the second. The third case

showed improvement for the first ten days, and then the organism seemed to have no effect.

In four cases of discharging alveolar sinus, the only result noticed was a decrease in the amount of pus discharged. In all these cases more radical treatment was necessary to obtain a cure.

The treatment of pyorrhea by bacterial antagonism seems to furnish the greatest cause for the hope it will have a recognized place in the therapy of this much discussed condition. Several years ago the treatment of pyorrhea by injections of commercial lactic acid into the pus pockets around the teeth was high in the favor of many of our best men. The basis for this treatment was two-fold: first, antiseptic action of the acid, and second, a solvent action upon the deposits on the roots of the teeth. That the first premise had a foundation in fact, I have shown already. That lactic acid is a slow solvent for the deposits around the teeth is also in the realm of fact. I have under way at the present time, experiments which are corroborating the findings of several other observers at this point. A report of the work will be given later.

The question naturally arises if lactic acid is both an antiseptic and a solvent for calcareous deposits, why was it not more successful in the treatment of pyorrhea?

The main reason seems to me to be that the acid was so quickly neutralized in the fluids of the mouth, that it really had but little opportunity to act. And it is just here that treatment by lactic acid bacteria may succeed where treatment by the commercial acid failed. With the bacteria frequently introduced into the pockets, and lactic acid constantly being formed to take the place of the acid neutralized, the deposits and the bacteria will be constantly in the presence of lactic acid. In other words, by this method the manufacture of lactic acid takes place in the mouth itself, and there is a reasonable surety that definite lactic acid is constantly present in the pockets.

In the six cases I have had under treatment, improvement was observed in every case.

One case, a young man of about thirty, had an unusual discharge, with marked looseness of the lower incisors. The first week no treatment was given except to inject into the pockets every other day about a cubic centimeter of a bouillon culture of



lactic acid bacteria. After the injection, wisps of cotton saturated with the culture, were tucked into the pockets and allowed to remain six hours, when they were removed by the patient. After the first week scaling was begun, and the deposit was softer than I had expected to find it. This was kept up at intervals for a month. The patient improved, and finally stopped treatment.

Dr. Santo, of London, Ontario, reports to me a bad case of pyorrhea which he is treating with the lactic acid bacteria. He has noticed a general improvement in the whole group of symptoms that were present.

No injurious effects have been noted in any of the cases.

Furthermore, in addition to the local treatment, I have given the lactic acid bacteria internally.

It is felt by some that pyorrhea and inestinal putrefaction, with auto-intoxication as a natural result, are in some way more or less associated, and I believe that there is much ground for that opinion. Hence the use of the bacteria internally as well as locally in treating pyorrhea. Also, in cases where pus is being swallowed at frequent intervals, the lactic acid bacteria can follow up their antagonistic action in the mouth, along the gastro-intestinal tract.

#### SUMMARY.

The results of the experiments in the laboratory, and the results that have attended the use of the lactic acid treatment clinically, warrant further study and experimentation in the application of this organism to oral disease, especially from a clinical standpoint.

In the various conditions met with in the practice of dentistry where this treatment would be applicable, pyorrhea alveolaris seems to be the disease most likely to be successfully treated.

If further experiences continues to show that the lactic acid treatment is of undoubted value, we shall have a clean, simple, and safe method of combatting the most resistant of diseases with which we have to deal.

I gratefully acknowledge my indebtedness to Professor Malory, Dr. Ordway, Dr. Haythorne and Dr. Hunter, who aided me by their interest and many timely suggestions.

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## THE THERAPEUTIC VALUE OF LACTIC ACID BACTERIA.\*

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The lactic acid organism, first described by Pasteur<sup>1</sup> as far back as 1857 with relation to lactic acid fermentation, has come into very great prominence of late years. It owes its high position in the bacterial world to Professor Metchnikoff<sup>2</sup> of the Pasteur Institute of Paris, who discovered the beneficial value of this organism in overcoming putrefaction of the intestinal tract, doing away with intestinal auto-intoxication and assisting in the prolongation of life.

As previously said, Pasteur was the first to discover the lactic acid organisms. He described it as a small globule or very short rod occurring singly or in clumps, rarely forming chains, and capable of fermenting lactose with formation of acid and gas.

In 1884, however, Hueppe<sup>3</sup> described a bacillus which he isolated from various samples of soured milk and was the first to name this organism "*Bacillus Acidi Lactici*." Hueppe's bacillus recognized as *the* lactic acid bacillus of the milk, is known now as the *Bacillus (Lactis) Aerogenes*.

More recent observers have described a number of other lactic acid organisms, the more important among them being; *Streptococcus Lacticus*, first described by Leichmann<sup>4</sup> in 1896, who named it "*Bacillus Lactis Acidi*" to differentiate it from Hueppe's "*Bacillus Acidi Lactici*." (Leichmann's organism, which was also described by a number of other observers, does not differ, however, morphologically and culturally from any

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other *Streptococcus* and is therefore known now as *Streptococcus Lacticus*.)

Another lactic acid bacillus, first isolated by Prof. Massol<sup>5</sup>, of Geneva, from Bulgarian Yoghurt and also studied by Cohendy<sup>6</sup> and Michelson of the Pasteur Institute of Paris, is known now as the Bulgarian Lactic Acid Bacillus (*Bacillus Bulgaricus*) and, according to Metchnikoff, gives most satisfactory results therapeutically. Its chief value lies in the fact that it produces the largest amount of lactic acid as compared with other lactic acid organisms. This advantage, however, becomes a marked disadvantage when it is found that the highly acid taste is not tolerated by most patients.

The *Bacillus Bulgaricus* is a long, slender rod occurring singly or in chains, rarely forming spores. It does not grow readily on artificial culture media, excepting, as described by North<sup>7</sup>, upon dextros bouillon containing pieces of calcium carbonate (marble). It grows very readily in milk at body temperature, not so at room temperature.

While there are a great number of lactic acid bacteria, several scores at least, yet those described above represent the three most important and distinct groups. All these bacteria are capable of fermenting carbohydrates or sugar solution with the formation of lactic acid, varying one from another in the amount of lactic acid they produce and their ability to overcome other bacteria with which they come in contact or to be overcome by others.

What happens to the milk when the lactic acid bacillus is introduced, is this: In milk the casein is in a state of partial solution, but as soon as there is formed from 0.7% to 0.9% of acid by lactic acid bacteria the casein precipitates. This phenomenon is commonly known as the curdling of milk. The precipitate is fine, readily emulsified by the fat present upon the slightest shaking, and then gives rise to a smooth, creamy beverage.

#### PERSONAL EXPERIENCE.

My own experience with the lactic acid bacillus and soured milk dates back to September 1905, when one of the most reliable local pharmacists approached me on the subject. This firm was then preparing and dispensing "Koumiss," while Metchnikoff, they thought, was advocating the use of "Kefir" (a Bulgarian soured milk). I was asked to examine the Koumiss prepared

by them and find out how it differed from the Kefir recommended by Metchnikoff.

Examination showed the Kefir to contain various forms of lactic acid bacteria and yeasts, but when carefully prepared with sterilized milk it made a good-tasting beverage.

The Koumiss prepared by the drug store people contained beside the lactic bacteria and yeasts, a variety of other extraneous bacteria.

The method of production of this Koumiss may be of interest.

The manufacturers would get an eight gallon can of milk into which they would introduce one or more yeast cakes previously broken up with the fingers. This milk would be allowed to stand in a warm place for twenty-four hours or longer and then poured into bottles, beautifully labeled, and sold as Koumiss.

Now, the milk was probably not of the best quality to begin with, and then it was allowed to stand without sterilization or pasteurization, for twenty-four hours in a warm place. This in itself is harmful or even dangerous. And this was only supplemented by the effect of yeast cakes handled in a non-bacteriological way.

I made the report upon my findings, offered my services to teach them how to prepare the Kefir properly and watched their procedure for a short time. I have since lost track of this firm.

Quite recently the butter-milk epidemic broke out again. This time Metchnikoff was advocating the use of soured milk prepared with a pure culture of the Bulgarian lactic acid bacillus. I began a fresh investigation of the subject, because the *Bacillus Balgaricus*, as we know, produced too much acid and was not tolerated by patients.

I examined various prepared soured milks, lactic acid milks or butter-milks in the market and found most of them to contain different kinds of organisms and yeasts which did not belong there. The many kinds of lactic acid tablets so widely advertised by commercial houses and found in the market under fancy names, contained other organisms and yeasts not mentioned in the advertisements. Besides, under the best of circumstances the tablets contained no more active lactic acid bacteria than are found in an equal volume of soured milk. A whole box of tablets, retailing at \$1.50, is equivalent in live organisms to not



more than a glass of lactic acid milk. This makes it rather a costly beverage even as an "elixir of life."<sup>1</sup>

Recognizing the value of properly soured milk as a food and to a certain degree as a combating agent for putrefactive and gas producing changes of the intestinal tract in the proper cases, I began investigations aiming to obtain a good-tasting and wholesome butter-milk or rather, lactic acid milk which could be prepared at home by a practical yet strictly sanitary method.

I isolated several strains of lactic acid bacteria from various prepared lactic acid milks and butter-milks. These organisms in pure culture were tested as to their ability to produce a palatable lactic acid milk.

After many tests I decided upon a bacillus which I isolated from among a variety of organisms. This bacillus (one of the Paralactic group of bacteria) in pure culture when implanted in sterilized milk produced a good-tasting, smooth lactic acid milk. Later, the results obtained clinically with this organism fully justified its use.

The next step was to find a practical way by means of which the patients could prepare at home a clean and wholesome butter-milk along bacteriological lines. The following method was found most satisfactory. Starters consisting of the above-described bacillus in pure culture implanted in sterile milk in little bottles were supplied with the following directions:

#### DIRECTIONS.

1. Take one quart of ordinary milk daily. (If the fat is not desired order one quart of *fat-free* milk from your milk man.)
2. Pour off half a cupful from quart bottle (to make room for starter).
3. Replace lid or cork (not tight).
4. Put the quart bottle containing milk in a saucepan of *cold* water.
5. Bring water round bottle of milk to a boil and keep it boiling for half an hour (to sterilize the milk.) *Do not boil milk.*
6. Remove bottle of milk from boiling water and let it stand in cold place until it COOLS.

<sup>1</sup>(A very careful study of the various tablets and preparations in the market was published by Heinemann in the Journal of the A. M. A., January 30, 1909. His investigations agree with mine in reference to the many lactic acid products in the market.)

7. When milk is cold, shake up starter (in little bottle) and introduce it carefully into the milk.

8. Put on cork or lid tight and shake it.

9. Place bottle in warm place (even temperature) on kitchen shelf (not any warmer than body temperature) for twenty-four hours.

10. At end of twenty-four hours the milk is fermented and should be of same consistency and smoothness as that of cream.

11. The next morning take your second quart of milk and repeat process exactly as you did with the first quart of milk (pouring off half a cupful, sterilizing the remainder, cooling it).

12. Pour in a little less than half a cupful (about as much as you had in little bottle) of the first quart of the already fermented milk in order to start the second, instead of starting your second quart with a starter as described.

After you have started your second quart from the first, the latter is ready for use and should be kept in icechest.

Thus you start your second quart from the first, and your third with part of the second etc.

Use this lactic acid milk as a food either *with* your meals (replacing tea or coffee) or as a last dish or between meals using a cracker or toast with it. *Do not drink it like water.*

(To cleanse bottle pour in a weak solution of household ammonia and let it stand for ten minutes or so. (This will remove the adhering particles readily.)

Lactic acid milk prepared in this way is preferable for these reasons: It insures a bacteriologically clean milk, free from extraneous germs. It contains a lactic acid bacillus in pure culture which gives rise to a palatable butter-milk. The heating of the milk in the prescribed way sterilizes it, killing off all the germs present in the raw milk without changing the taste nor the consistency as in the case of boiling. This butter-milk contains all the nourishing elements of milk in which respect it differs from the dairy butter-milk and is much more tolerated by people who cannot take ordinary milk.

The chief requisites in my opinion therefore are a clean, sterilized milk fermented into lactic acid soured milk by any one or more of the various lactic acid bacilli in pure culture. The latter when implanted in sterile milk should give rise to a smooth and palatable soured milk.

The things to avoid are unclean milk, not sterilized milk, and uncleanly methods of starting or preparing the soured milk. Several harmful germs that may be present in the raw milk or introduced when starting the milk may develop alongside of the harmless lactic acid organism while the milk is allowed to be fermented. There is nothing dirtier than a dirty milk; the opalescence will hide everything, sometimes the dirtiness will be detected in taste; but as a rule it will not.

#### THERAPEUTIC APPLICATION.

The lactic acid group of bacteria is of greatest therapeutic value when administered in the form of soured milk, probably because of its ability to ferment milk with the production of lactic acid. The latter substance in its nascent state as well as the bacteria themselves when introduced into the intestinal tract seem to help overcome putrefaction. Active lactic acid organisms introduced into the digestive system will keep on producing lactic acid as long as there is present enough convertible food supply (which as a rule is never lacking). The putrefactive wild germs present in the intestinal tract, which only grow in an alkaline medium, are replaced by the lactic acid organisms which change the alkaline into an acid medium and thus arrest putrefaction. At least this is the theoretical explanation of this method of fighting putrefaction, although there is as yet no scientific evidence that this is really what happens. However, it is reasonable to believe that this is the case.

Another claim made for the lactic acid bacillus and its products is that it will retard the natural hardening of the blood vessels (arterio-sclerosis) of old age, and will thus give rise to longevity, as the old saying is that "one is as old as his blood vessels are."

My personal experience with the lactic acid milk, however, from the clinical standpoint, has led me to the belief that, while one is taking a quart of lactic acid milk a day with crackers or toast, there is sufficient nourishment in that itself, so that one can discard meats, particularly red meats, and other food articles some of which may be responsible for the introduction into the intestinal tract of putrefactive organisms which keep up putrefactive changes there. These harmful foods, also alcoholic and aerated beverages, are responsible, in a measure at least, for

putrefaction and ultimately for arteriosclerosis. So that the change in diet and the elimination of harmful agents of food is one of the chief phenomena in arresting the progress of old age, while the lactic acid milk is not only a good substitute in the change by virtue of the lactic acid organism it contains is capable of overcoming putrefactive bacteria already present there.

In my practice the lactic acid bacteria in the form of soured milk has proven quite efficient in some cases in counteracting intestinal flatulency, which in itself was sufficient to give rise to pain and marked discomfort. One or two illustrative cases will not be out of order here.

Dr. H. M. C., 51, while on his vacation last August, noticed suddenly excessive gas and flatulency, both gastric and intestinal; precordial pain, intermittent heart, unable to do much of anything, appetite diminished, general malaise. The excessive pain from flatulency was present all the time; the precordial pain "simulating angina pectoris" was intermittent. This condition continued for about two months without relief under ordinary methods of treatment (intestinal antiseptics, Beta Naphthol, etc.). I advised him to take one pint to a quart of the lactic acid milk prepared according to directions previously described. The abundant gas production and the distressing precordial pains in the intestinal tract disappeared within a week. At end of a few weeks he felt so well that he thought of giving up the lactic acid milk. This he did, only to resume it at end of three or four days on account of return of the symptoms. He now continues to use about one pint daily of the lactic acid milk which he considers a good, palatable food. He is practically well ever since. Appearance of stool normal. Odor, which was very foul, is now normal; no gas whatsoever; has gained some in weight.

This case illustrates the effectiveness of lactic acid milk to combat the gas production in the intestinal tract. Similar results have been obtained by other observers and by myself in other cases. (The beneficial results observed in some cases of so-called "rheumatoid arthritis" by the use of lactic acid milk is probably due to the counteracting of the gas, which, if excessive, is claimed by some to cause displacement of abdominal viscera with subsequent rheumatic pains.)



Case 2. Dr. E. L. T., physician, middle age, in a state of general malaise, has always been very thin, always losing rather than gaining in weight. The first time I was called in to see him he was in bed too weak to get up. The only abnormality found was a sub-acute infection of the throat. Cultures showed the infection to be a pneumo-staphylo from which a vaccine was made up and with which he was treated. Besides, he was advised to take daily a quart of home-prepared lactic acid milk. Within two weeks the infection was practically cured, and the patient gained steadily in weight, weighing now more than he ever did before. His general condition "excellent," feels like "really doing things." He still continues the buttermilk which he enjoys taking—a glass after each meal. His own story follows:

"Mean for two weeks—no temperature. Bed Nov. 3, T. 102, P. 90 Nov. 4, first injection of vaccine, Dr. Medalia, injected every other day. Nov. 16, first time out. Dec. 2, began to do work like myself and gained steadily—from 134 to 150 pounds."

This case illustrates the value of soured milk as a good nutritive food. The nourishing element of the lactic acid milk has also proven in my experience to be of great value in consumptives. The patients who would get "bilious" and sick of ordinary milk in the forced feeding treatment, have taken milk in this form with relish.

So much for the therapeutic value of the lactic acid bacteria in the form of soured milk.

As to the therapeutic value of *b. Bulgaricus* (Massol) in pure culture in bouillon when applied directly to infected cavities and wounds of the body, nothing definite could be said as yet. Although of some help in leucorrhœal discharges of the vagina, infection of the bladder, also in cases of ozena and chronic middle ear infections, etc., in all these cases when applied it does no more, if as much, than the applications in those cases of any mild antiseptic such as dilute Lugol's solution or argyrol, etc. I could not see in it the general panacea claimed for it by the various manufacturers of the lactic acid products. We may hope to counteract by it putrefactive organisms as such wherever found, and which are probably responsible for the bad odor in ozena. According to Goddal<sup>8</sup> a distinct effect is produced by the cultures in some cases of ozena characterized by general crust formation. He compares the results to those produced by argyrol and it

remains to be seen, he says, whether more than a temporary effect is produced; while in localized chronic suppurative sinusitis with polyp formation he noticed no effect. North's conclusions are not much stronger than Goodale's where he says in part that the use of the cultures as a spray on inflamed surfaces or cavities often diminishes the discharge, it often diminishes the odor caused by putrefaction, it *sometimes* reduces swelling, especially of the erectile tissue of the nose. He further says that both acute and chronic inflammations due to infection, whose seat may be reached by the cultures may *sometimes* be checked, and that the use of these cultures seem to be accompanied by no special danger and cause no irritation.

These cultures are used then as nothing more than a local application. If this does no more than any other local *antiseptic* application, it is inferior to the latter, because the antiseptic is supposed to be not only bacteria-free, but should kill any bacteria which may be introduced by handling, etc., while the lactic acid culture is supposed to contain live bacteria and the culture medium itself is favorable to any bacterium with which it will be contaminated by handling, etc., and as such is, one might say, a sort of double-edged sword. It may contain harmful organisms as well as the harmless ones, and although the acidity in the culture may overcome certain kinds of bacteria, yet it cannot always be depended upon to overcome all kinds of bacteria. I could not cite any cases here as treated with the cultures, because in no case where I used it have I depended upon the cultures alone, but have at the same time treated the patients with vaccines.

In the mouth the presence of the lactic acid organisms is not to be looked upon with such favor as when present in the milk and introduced into the intestinal tract, for, according to Miller<sup>9</sup>, this lactic acid group of bacteria is capable of producing all the essential phenomena of caries of the teeth (out of 22 mouth bacteria 16 were found by him to produce lactic acid in sugar solutions). The carbohydrate food collecting in favorable places on the teeth undergoes acid fermentation with decalcification of the enamel, after which the bacteria penetrate the tubules giving rise to caries. For this reason I caution my patients to wash their teeth with a weak Lugol's solution (1 part to 10 of water) after taking the buttermilk. I do not consider it wise to apply cultures of lactic acid bacteria in the neighbor-

hood of the teeth, as it is recommended, for instance, in pyorrhea, because they are just as likely to destroy the enamel of the teeth and produce caries as they are capable of removing and softening the tartar.

Before concluding, I cannot too strenuously recommend the thorough inspection by the Board of Health of the many buttermilks and lactic acid milks in the market on the same principle as the inspection is carried on for ordinary milk. It seems strange that the public should be so thoroughly protected against impurities of ordinary milk while any old or spoiled milk may be turned into "buttermilk," and no pure food law nor inspection will reach it, leaving the public unguarded against this impurity. There ought to be a definite law laid down as to what is meant by the various fancy names such as Koumiss, Kefir, Yoghurt, etc., what they are to contain in the way of bacteria and what not, and whether or not they really are what they are supposed or advertised to be, also some definite understanding and inspection of the various "buttermilks" sold in every corner of the city.

Surely there must be some way of protecting the people against the impurities of this new article of food, and the Commissioners of the Pure Food Law and the Boards of Health have another duty to perform for the public.

### CONCLUSIONS.

My investigations therefore lead me to the following conclusions:

1. Lactic acid milk when prepared at home from tablets is unreliable as to taste and bacterial contents.
2. The objection to the use of the tablets in their dry state is their unreliable bacterial content, the loss of viability of organisms in their dry form, and the high price.
3. Buttermilk, pure and simple, when obtained from the dairy man varies considerably as to taste (at times very sour, sometimes bitter) and bacterial content and is therefore unreliable. It is also deprived of the principal nourishing elements of milk. (The buttermilk as obtained from the dairy man is a side product with him, is the watery fluid left after churning the butter, and as such probably not much attention is paid to its keeping, handling, etc.)
4. The Bulgarian lactic acid bacillus (b. *Bulgaricus*) so

highly recommended by Metchnikoff, produces too much acid which taste is not tolerated by most patients. For this reason Metchnikoff is advocating now the use of the Paralactic organism mixed with the bacillus Bulgaricus in order to obtain a better tasting soured milk. Which of these two organisms is responsible for the good results cannot be definitely determined as the b. Bulgaricus does not grow readily at room temperature and is therefore outgrown by the Paralacticus which grows most readily at room temperature. It might be safe to say that the beneficial results are apparently due to the latter.

5. A good, clean soured milk can be obtained by means of any lactic acid organism in pure culture implanted in sterilized, but not boiled milk. The palatability, however, being an important factor, makes it necessary to choose the organism best suited for this purpose.

6. The therapeutic value of soured milk depends chiefly upon the lactic acid organisms it contains as well as upon the fact of its being a good food article and *not* upon any particular kind or variety of the lactic acid organism. Any *clean*, palatable milk properly soured would answer the purpose.

7. A good-tasting buttermilk can be prepared at home from sterilized milk with a "starter" of lactic acid organisms. One starter will last for several weeks or months if the directions for the preparation described in the article are carefully followed. A new starter should be obtained upon the first sign of contamination detected in taste or in change in the manner of curdling.

8. The b. Bulgaricus in pure culture in dextrose bouillon as a therapeutic application in infectious processes, although of benefit in certain conditions as a good local antiseptic, is not a cure-all and must be used with caution. In the oral cavity it should be used with great care, if at all, because the action of the lactic acid upon the enamel may give rise to caries.

9. Public safety demands that the various butter-milks or soured milks in the market should be thoroughly inspected by the health and pure food authorities.

#### References:

<sup>1</sup> Pasteur, *Ann. de Chim. et Phys.*, Serie 3, 1858, 52, p. 404.

<sup>2</sup> Metchnikoff, Elie, "Prolongation of Life," G. P. Putnam's Sons, N. Y., 1908.

<sup>3</sup> Hueppe, Ferdinand, *Mitth. a. d. Kaiserl. Gesundh. Amt.*, 1884, 2, p. 309.



<sup>4</sup>Leichmann, G., *Centralbl. f. Bacteriol. Abth.* 2, 1904, II, pp. 600 and 733.

<sup>5</sup>Massol, M., *Revue Medicale de la Suisse Romande*, 1905, p. 716.

<sup>6</sup>Cohendy and Michelson, *Comptes rendues de la Soc. Biologique*, March 17, 1906.

<sup>7</sup>North, Chas. E., *Medical Record*, N. Y., March 27, 1909.

<sup>8</sup>Goodale, J. L., *Boston Medical and Surgical Journal*, July 15, 1909, Vol. CLXI, No. 3, p. 83.

<sup>9</sup>Miller, W. D., "The Micho-Organisms of the Human Mouth," *The S. S. White Dental Mfg. Co.*, Philadelphia, 1890, p. 105.

## THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of The New York Institute of Stomatology was held Tuesday evening, December 7th, 1909, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The President, Dr. J. Morgan Howe, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

Dr. Merritt read the following notices which had been prepared by the Committee on Research:

The New York Institute of Stomatology is pleased to announce that William J. Gies, M.S., Ph.D., Professor of Biological Chemistry in Columbia University, has consented to direct a scientific study of saliva, its constituents and variations, with a view to determine the relations of that fluid to dental diseases. To that end Dr. Alfred P. Lothrop, one of Prof. Gies' assistants, will devote his time to the work, and the members of this Institute, and all other dentists and physicians who are interested, are invited to co-operate, by obtaining specimens of saliva from patients who are either immune to dental disease, or who exhibit extremely bad dental conditions, such as active and rapid decay, progressive erosion, constant precipitation of salts causing tartar, and pyorrhea alveolaris. Each specimen of saliva is to be accompanied by a careful statement of the clinical observations of the conditions appearing in and about the teeth. These specimens with the clinical records will be collected in Manhattan Borough, on notice being given to Prof. Gies, 437 West Fifty-ninth street, by telephone or otherwise, and will be carefully examined in the laboratory of the College of Physicians and Surgeons. Those outside of Manhattan are to send specimens and records to the

laboratory. Arrangements have been made for this research work to continue at least until the end of the present academic year, and it is greatly desired that a large number of dentists assist as above indicated. All who will do so are invited to send their names and addresses to one of the members of the Research Committee of this Institute; they will then be supplied with bottles for holding specimens and a sheet of directions from Prof. Gies.

GEORGE S. ALLAN,  
ARTHUR H. MERRITT,  
J. MORGAN HOWE, *Chairman.*

Dr. Wheeler moved that an invitation be sent to the various societies in New York, Brooklyn and Northern New Jersey, that any members who are sufficiently interested in this work co-operate in the same through the Committee on Research. The motion was carried.

*Dr. W. D. White*—A few weeks ago a member of this society visited me at my office and I asked his opinion of the method with which I was experimenting of attaching a platinum band to a porcelain crown and concealing it by means of porcelain. His opinion was very encouraging and at his suggestion I am placing it before the society for its consideration.

In presenting this matter I shall try to be as clear and concise as possible. The idea is to give to the crown the additional strength of a band, cover the band with porcelain of such a shade as to give a natural appearance, and at the same time avoid the overlap or ledge which the usual banded crown presents beneath the gum.

I believe that while the fitting of such a crown requires considerably more labor and the exercise of greater care in perfecting the joint, that it is entirely practical and much more sightly than the average crown on which a band is used.

By means of the illustrations which are purely diagrammatic I will try to explain the method I have used.

In the work so far I have used the White detachable post crown. The crown is first fitted to the root in the usual manner, except that the joint is made a slight distance from the gum—(approximately a sixteenth of an inch) instead of at or beneath the gum margin. After this has been done the protruding end of the root is reduced in size at all diameters, or in other

words the circumference is reduced something more than 1-16 inch, and the same done to the base of the crown. The joint will now be as shown in Fig. 1.

A platinum band, 34 or 36 gauge, is next fitted tightly to the diminished base of the crown, and it will necessarily also fit the corresponding part of the root. The width of this band should be somewhat more than sufficient to reach from the points marked A and B.

After this has been done and it is seen that with the band in place the crown and root came into proper apposition, the band is held in place upon the base of the crown, porcelain body is laid around it and a first baking is done. It may then be again tried in the mouth. More body is added and it is rebaked. A slight excess of porcelain is baked about the band so that another fitting may be made and the proper contour of root and crown obtained by polishing away the surplus porcelain.

I have two samples of the work here which will show the idea more clearly than the drawings which I have submitted.

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The paper of the evening was read by Dr. Arthur H. Merritt, on "The Local and Vaccine Treatment of Pyorrhea Alveolaris."

(For Dr. Merritt's paper see March, 1910, issue, page 55.)

#### DISCUSSION ON DR. MERRITT'S PAPER.

*Dr. Nathaniel Bowditch Potter*—It is peculiarly gratifying to me to have the privilege of speaking on this subject to-night—doubly so, because I feel an especial indebtedness to the reader for his skill in curing a patient of mine who was about to be operated upon for a very obstinate neuralgia. His success in curing this patient prevented the operation, and she has been well for a long time. So I have listened with added interest, and with the feeling that what he has told us to-night has an especial authority. In that case Dr. Merritt did not use vaccine therapy. I have practically nothing to add to what he has said upon the subject of pyorrhea alveolaris from the standpoint of one who is interested in the opsonic or vaccine method of treating disease. Dr. Merritt has so conservatively and ably presented the facts upon the subject, that I would hesitate to criticise or even attempt to supplement anything. In place of that, I will say a few words



*Fig. I.*



*Fig. II.*





upon the general principles of the subject, and upon the medical side of the vaccine treatment.

The vaccine treatment, we might say, began with the use of vaccinia—the inoculation of vaccine to prevent smallpox. That preventative inoculation is on a sound foundation, although we do not know the germ which causes the disease. We know also that plague and some of the other diseases have been prevented by the use of a preventative inoculation. Typhoid fever, for example, can be prevented in individuals exposed by raising the opsonic index, and the method in use is quite the same as Dr. Merritt has told you—a vaccine prepared in similar ways. Wright and Leishman, in England, have brought this to such a point of perfection that the hospital in Boston, where I was once an interne, offered such a prophylactic inoculation to the nurses and those attendants in the hospital who are exposed. They found that quite a number of nurses and orderlies had acquired typhoid fever during their attendance upon such cases in the hospital. These are examples of *preventive* inoculations.

Of course, in the nature of *curative* inoculations, we have the most wonderful of all—that against the disease of hydrophobia. As you know, Pasteur inoculated a virus, the nature of which we do not know even to-day, and prevented the severity or the onset of the disease.

Another type of inoculation about which all of you know probably more, or just as much as I do, is the inoculation to prevent diphtheria. We possess a preventive inoculation, and also a therapeutic inoculation against diphtheria. The latter attempts to induce a passive immunity. We take the serum from a horse who has been so trained to withstand the inroads of diphtheria toxin that a small dose is potent enough to cure a patient with diphtheria.

As to Dr. Merritt's use of vaccines—that is an attempt at definitely active immunity. We introduce this culture under the skin, and arouse the defensive organisms of the body.

I do not believe that the taking of the so-called opsonic index, of which Dr. Merritt has told you—comparing the phagocytes of the normal individual with those of the diseased individual—is of sufficient value to warrant the time and expenditure required. Most of us who have interested ourselves in America on this subject have come to about the same conclusion.

In the first place, the method is very time-consuming; it is very expensive and liable to many errors. W. H. Park and I fully determined that the many inaccuracies inherent in the method must influence our results materially. Two Danish investigators in Copenhagen showed conclusively, to my mind, at least, that the opsonic index had too many inaccuracies to be of great value. One very striking difficulty, and one which Park has repeatedly pointed out, is this: You take the patient's blood, and send it to the laboratory to have his opsonic index taken, and you receive the result the next day. You do not know what his opsonic index is at the time you want to inoculate him. It may be higher or lower at that time.

Besides the use of bacterial vaccines, there are many other methods which bring in similar influences to work as stimulating directly by a chemical means (if we can call it such) as vaccines. I speak of such things as venous hyperaemia, which I have no doubt you are using as much as surgeons. I might also mention massage. Only to-day my dentist discovered a tender place about one of my teeth, and he suggested massage of the gum over that tooth. Of course massage, or venous hyperaemia, will bring the protective substances to a diseased part, and if the blood serum can bring those protective substances there, they are bound to do good.

I could talk to you for an entire evening about the successes we have had in the use of vaccines. I would speak of the fact that gonorrheal arthritis has been benefited in many cases, that in tuberculosis and in joint affections caused by the tubercle bacillus, and in various other forms of tuberculosis, there has been marked benefit; but the one disease which has been improved most, is furunculosis, in which Wright first used them. I personally have never seen anything as convincing as its use. It is almost, although not quite, as convincing as the use of the modern serum in cerebro-spinal meningitis, for which we are indebted to Dr. Flexner. The reason it is not quite so convincing is, we are dealing with a chronic condition—one which is very hard to influence, and in which the mechanism of repair is very much in abeyance, and in the localized staphylococcus infections, vaccine therapy has achieved its greatest results. I personally have not been convinced that the results have been as striking in other infections. The last use to you in giving

my impressions, is to tell you not of successes, but of some of the failures. I have seen some cases that I thought were utter failures, and a parallel might be drawn to your work in pyorrhea in such cases.

A young lad I saw in a Brooklyn hospital was shot in the hip by an explosive bullet. He lay there suppurating for eight months. Fragments of bone were removed at first, and a series of operations were made by skilled surgeons without much effect. He ran a temperature of over 100—from 100 to 104—sometimes with chills, sometimes without; but it was evidently not a general infection, because the blood cultures that were taken were negative. They called upon all sorts of assistance, and finally happened to summon me. We made cultures and found a series of germs. We determined that they were streptococci and staphylococci. We inoculated him with successive doses interspaced as carefully as I could from my clinical judgment—I did not use the opsonic index. When I left for my summer holiday, leaving him in the hands of the pathologist who prepared my vaccines for me, he had improved. I did not believe our vaccines would be of much avail, unless the surgery of the part were absolutely perfect. The surgeons thought that there was nothing more to be taken or cut away that need be taken or cut away. While I was away on my holiday the boy went down hill again; and they removed a large necrotic fragment of the head of the femur, a part of the acetabulum encased in a pus cavity.

That is a very potent illustration for you to take home. I could not cure him with the vaccines unless the source of infection was properly drained and treated. That is the striking example you can apply to the use of vaccines in pyorrhea alveolaris.

My personal impression is that the vaccines will only be a small adjunct to your therapeutical armament. I think Dr. Merritt's success has depended more upon his care as a surgeon, his mechanical skill, and judgment, than the use of the vaccine. I believe, however, that there are some cases—Goadby has published a number in England—where there is suppuration and chronic boils and chronic sinuses—where you can improve the patient materially, brace him up, and increase his resisting power;



but I do not believe you will get at the cure of your disease by vaccine therapy.

The literature on the subject of pyorrhea—in medical literature—is rather unconvincing to me. For several years I read the history of every case that was treated by vaccines, and among them I read of many cases of pyorrhea. My own feeling is that it is not convincing. It is a help in some cases, perhaps a little dangerous help, because except in the hands of anyone who has done a great deal of it, it is not without danger. I know I have depressed people, and have inhibited a production of their protective substances, despite the fact that I have worked at it for some years. I should warn you against using it indiscriminately—especially the use of the stock vaccines. I think they will bring you poor, if not bad, results.

One other point—anybody who comes regularly, once in five or ten days, and receives a treatment so objective as the inoculation of a definite vaccine about which they have read in the newspapers and have heard talked about—something decidedly new and in accordance with the latest bacteriology—receives a profound psychic influence. All the psychic influences at the command of that patient are bound to be profoundly influenced. I think we must always take that into consideration, as well as the purely bacteriological influence of the vaccines in judging calmly their value.

*Dr. Harold S. Vaughan*—I have been interested in the treatment of pyorrhoea alveolaris by opsonins since the first cases were reported over four years ago, but have not taken it up for the reason that it seems contrary to the principles of opsonic therapy to treat mixed infections with single vaccines. Nearly all the reported work on the opsonic treatment of pyorrhea alveolaris has heretofore been by men of experience in opsonic therapy, but of limited practical experience with this disease. We are therefore very fortunate in having the report of one familiar with this condition from its various standpoints.

In considering this subject it must be borne in mind that phagocytosis as stimulated by opsonins in the serum is only one of the means by which the body protects itself from bacterial invasion. Some substances found in the blood work in an entirely different way; i. e., by bacteriolytic and bacteriocidal action, others act as antitoxins neutralizing the bacterial toxins. Agglu-

tinines and presipitines are examples of other specific substances.

According to Wright many of the common bacteria are absolutely insensible to opsonic action. He names as examples the bacillus of diphtheria and its associated bacillus xerosis. Again, many bacteria are not sensible to the bacteriocidal and bacteriolytic action of the normal blood, but are sensible to the opsonic action—examples are the streptococci, staphylococci and pneumococci.

Thus, we see that many of the infecting organisms are immune to opsonic action. About the only bacteria used in the preparation of vaccines for pyorrhea have been the pneumococci streptococci and staphylococci, which would appear as an assumption that these organisms play the active role in this infection. Anyone examining smears from the gums in this disease will notice a great variety of organisms—therefore, the great objection to the use of opsonins in the treatment of pyorrhea alveolaris lies in the one fact that this infection is not caused by a specific bacterium. In a given case we find a great variety of bacteria, many of which we are unable to grow by cultures for practical use—an example is the fusiform bacillus and spirillum of Vincent, which have been the active agents in a number of cases seen by the speaker.

Smears in a case of infection with Vincent's bacteria may appear as almost pure growth, yet cultures will not show these organisms, but only varieties that are capable of being grown.

Because of a low opsonic index to the organism cultivated we assume that the patients phagocytes are not reacting sufficiently to that organism, but at the same time there may be other varieties present and if cultures could be obtained and vaccines prepared we would undoubtedly also find a low opsonic index against them.

A low opsonic index for one particular organism does not necessarily mean that that organism is the most active factor.

Although the opsonic treatment of pure infections is effective, it seems to the speaker that it is far too limited in scope when applied to a mixed infection like pyorrhea, in that it is impossible at present to obtain and inject vaccines of all the infecting organisms, and the use of only one vaccine acts to raise the index against that one particular organism.

It would seem advisable to carry on some of these cases with

controls; i. e., to observe a series in which absolutely nothing is used but an autogenous vaccine (not even a mouth wash), and another series in which nothing is done. In that way the inhibiting action of the vaccine might be measured.

A few years ago much was being said and written about the treatment of pyorrhea by electro therapeutics, especially the X-Ray and many were the cures reported. The treatment was always carried on in conjunction with recognized local and general measures, and it is now known that the benefit from the X-Ray was only similar to that produced by the action of astringents and escharotics and that the improvement in these cases depended more on the thoroughness with which the associated treatment was carried out. This applies to the opsonic treatment of pyorrhea also, as the reported cases have been carried on in conjunction with methods that can be said to be curative, if each case is studied by itself, and the proper indications followed. Opsonic therapy can only be an adjunct to other treatment.

The thorough removal of infected deposits is sufficient to check the suppuration, this may mean in addition to thorough scaling, the excision of hypertrophied gum in the obliteration of a pocket or sinus, the amputation of a necrotic root, the immobilization of loose teeth by splinting to prevent the aspiration of infection along the root and in addition appropriate general treatment.

The essayist speaks of employing vaccines for about a month before beginning the surgical treatment. The vaccine is directed against the activity of one species of bacteria, but it does not remove the infected areas. It would seem better to at once clear away the infected masses, thus removing other active bacteria that are not influenced by the vaccine.

From a review of the subject I should conclude that the opsonic treatment of pyorrhea is necessarily very limited.

First. Because the infection is distinctly a mixed one.

Second. The use of many vaccines would require a complicated technique.

Third. The inability at the present time of obtaining cultures in many cases of the obviously active bacteria.

Fourth. The fact that the body does not always depend on phagocytic protection. Many bacteria are opposed by bacteriolytic

and bacteriocidal action of the serum. Others have their products neutralized by antitoxins.

Fifth. The immunity obtained for a given species of bacteria is not lasting. Some of Wright's cases treated for furunculosis showed immediate relapses.

One thing has been brought out, and that is, that the subjective symptoms are almost always markedly improved by opsonic treatment.

I had the pleasure this afternoon of seeing two of Dr. Merritt's cases. They were very typical of pyorrhea, or had been, and Dr. Merritt is to be congratulated on the results obtained. Of course, the question arises, could these results have been obtained without the use of vaccine therapy, and I am rather inclined to that opinion. In speaking to one of the patients, she said that Dr. Merritt had relieved her—practically cured her, as she considered it—five or six years before, and had seen her at various intervals, and kept her comfortable. During a lapse of ten months the disease had returned, so it was worse than ever. Immediately following she was carried along with opsonic therapy in addition to the local measures from October until February. Since that time she has had chiefly local measures.

In speaking with Dr. Merritt he admitted that his technique has improved very markedly in the last two or three years, especially since he has been so interested in opsonic work, and since he has used local anaesthesia in practically all cases in clearing the pockets. Therefore, this patient who is so markedly benefited, might perfectly well be benefited by his increased skill.

The other case was just as convincing, as far as the relief of the conditions was concerned, but the chief point brought out there was the relief of her subjective symptoms without local treatment—without apparent relief from the suppuration.

On the whole, we are greatly indebted to Dr. Merritt for his work, and for the conservative stand he has taken.

*Dr. R. T. Moffatt*—We have had a little experience in Boston along these lines. I have had one or two practical cases with very good results, and they may be of some interest to you. I would also like to speak of one case which was not really a pyorrhea case, but what we know as a lateral abscess, which is very painful, and heretofore the only remedy for which, as far as my knowledge went, was extraction.



Dr. Merritt spoke of limiting his treatment at each appointment to a few teeth. That has not been the policy I pursued, and it seemed to me better results were obtained by cleaning the mouth roughly at the first treatment to get rid of as much debris as possible. Patients complain of the sensitiveness caused by instrumentation, and that can be modified at the first sitting—by getting rid of the deposits of fermenting food about the gingival margins. When we limit our treatment to two or three teeth, there is a possibility of infection from the other teeth, and we do not get as good a result as by taking the mouth as a whole and cleaning it as much as possible at the first sitting.

Dr. Merritt spoke of the length of time elapsing between the injections. One or two of my cases have been benefited by giving the second injection thirty hours after the first. The dose that was given I think might be considered large. The autogenous vaccine was not used, but a stock solution, 80 million pneumococcus and 250 million staphylococcus, and immediate benefit was noticed, especially in regard to the freedom from pain.

One of the most interesting cases where vaccine was used was with a lateral abscess. The patient, female, age about 40, had a lateral abscess on the upper left wisdom tooth. One Saturday afternoon the pain commenced. The tooth had been opened a week or more prior to the beginning of the intense pain which ensued. The pulp chamber was found filled with gas, and was left open for vent. A day or two afterwards an attempt was made to close it, filling the root canal with an antiseptic dressing on cotton, but in less than ten minutes the pain recurred. The tooth was very sore and lame, and could not be treated properly, as we all like to do, so palliative methods were tried. The cotton was removed and the pain subsided. The following Friday the tooth started to ache violently, and by Sunday morning the patient was suffering intensely, and was kept awake all night. She was a patient who was well able to and did bear pain uncomplainingly; but on this occasion the pain was so great that she would walk up and down stairs, and then walk around the room, try to lie down, and then try moving about again. We used different remedies and finally the hypodermic. She sent for her physician, who arrived at 10 o'clock a. m., and by 10.10 he had given this vaccine dose I speak of, and in an hour and a quarter the pain was bearable, as the patient expressed it. By

12.30 the pain had entirely subsided, and did not return until the following Saturday. It was my intention to extract the tooth as soon as opportunity presented—on the following Monday or Tuesday, but the patient was so exhausted that she decided on the advice of her physician to defer the operation. On Saturday a week later the pain commenced again, and on Sunday the vaccine was tried again, with the same good results. The tooth was afterwards extracted. The vaccine treatment did not cure the trouble, but it relieved the pain at the time and nothing else would.

Another case was that of a woman of about fifty, where it was considered that the instrumentation had been practically perfect. Cures were obtained in all instances except on the lower right sixth-year molar, anterior root. There it persisted. The root was apparently as smooth and clean as glass. The case was referred to another dentist, who had a special set of instruments, but he did not make any improvement, although his treatment was pretty severe. Finally, the vaccine treatment was instituted and carried on for about three months, but without improvement. That is practically the only failure I have had, using it in six or seven cases. Replying in a general way to some subjects of the paper, and also to what Dr. Potter said—in Boston Dr. Madalia has used the opsonic index as an indication for certain obscure febrile conditions, making the index at three days intervals, and finding that in these different diseases it varied, so that it offered a very favorable index for differential diagnosis.

In cases of acute pain there is not sufficient time to make autogenous vaccine, although it is undoubtedly true that where it can be used, as in pyorrhea cases, better results are obtained than with the stock solutions.

*Dr. M. I. Schamberg*—I have been intensely interested in the subject, and have watched Dr. Merritt's, as well as the work of other members of the profession who have endeavored to relieve pyorrhea by means of vaccine treatment. I have been interested in it largely because I had hoped that should this form of treatment prove valuable in the cure of pyorrhea alveolaris, that it would be equally beneficial in dealing with other suppurative conditions about the mouth. We have a problem before us to-day in the extraction of teeth, which is quite different

from that which confronted the extractors of many years ago, in that almost every case which applies now for extraction exhibits some infection within the bone, which is not entirely relieved by the removal of the tooth. Formerly teeth were taken out before these infections occurred.

In regard to the subject as it was dealt with this evening, I believe it has been presented in a manner to be sufficiently encouraging to careful observers who will combine this form of treatment with the necessary instrumentation and medication of pyorrheal pockets, and it is sufficiently discouraging to those men who are looking for an easy method of dealing with pyorrhea. The paper is exceptionally valuable, owing to the very fair, impartial and conservative manner in which it was presented.

There was some reference made by Dr. Potter to the value of the vaccine treatment in furunculosis, and it may be interesting to note that I have been able to trace the cause of several marked cases of general furunculosis to suppurative lesions of the mouth.

Dr. Vaughan spoke of Vincent's spirochete, as the most prevalent organism in pyorrheal pockets. This conforms with the finding of other men who apply to pyorrhea, the name Vincent's angina. I heard of a patient not long since who was sent to a very competent dental practitioner in this city, who intended treating the patient for pyorrhea alveolaris. Later, the patient left the dentist's hands and wrote a rather indignant note, in which the patient called the dentist's attention to the fact that his physician found he was suffering from Vincent's angina, and not pyorrhea.

Vincent's organisms can be found about the mouth in most any case where putrefying substances lodge and we all know that pyorrheal pockets are almost always filled with oral debris.

There is so much to be taken into consideration in the study of pyorrhea, that it is almost impossible to arrive at any one definite method of treating the disease. We all know how much benefit is derived from mechanical or surgical treatment, and we all equally know how little can be hoped for in certain forms of pyorrhea. The most important point is the proper diagnosis of the character of the trouble with which we are dealing.

Dr. Merritt's work will help us in dealing with a certain class of mouth infections, but I believe more can be accomplished in certain forms of pyorrhea—which are undoubtedly of diabetic

origin, or are markedly influenced by diabetic blood, if the patient receives treatment for that particular disease. Instrumentation in these cases is best deferred until the patient's condition warrants the local treatment.

We find, too, that in the rheumatic and gouty forms that constitutional treatment directed to the underlying cause will do as much, if not more, than the opsonic treatment, instrumentation, or anything else, but we, of course, know that to allay an inflamed periodontal membrane, deposits which are irritating that membrane must be removed from the teeth.

My main purpose in rising, was to congratulate Dr. Merritt on his work, particularly in that he has presented it in such a fair way. He leads us to believe that much may be hoped for in a proportion of cases when the opsonic index is properly studied, and when the treatment is properly applied; but that we may not expect too much in all cases.

Personally, I will watch with interest the further progress of this study, so that I may be able to utilize it in dealing with other suppurative conditions about the mouth, in which individual organisms are more likely to be found than in pyorrheal cases.

*Dr. W. D. Tracy*—In the past I have felt that I had been negligent in not spending more time to familiarize myself with the mysteries of the opsonins and the opsonic treatment in its application to the control of pyorrhea. The suspicion that I might be omitting a study of something that would be of great value to my patients caused me to experience a feeling of guilt.

After hearing Dr. Merritt's essay on the subject and listening to the interesting discussion that followed, I am comforted by the thought that I am, at least, partly exonerated, because the evidence brought out would indicate that the opsonic method of treatment is of doubtful value in the field of special work occupied by the dentist.

If, after further research this method of treatment should prove to be of value in controlling pyorrhea, it would seem to me that the work must necessarily be in the hands of a few men of experience who would virtually be specialists in opsonic treatment.

Dr. Potter's caution to us is a timely one, though I do not think that many general practitioners of dentistry who have not taken the medical course will feel prepared to bare the arms or



backs of their patients and inject the serum, especially in view of the doubtful virtue of the remedy.

The fact that more dentists have not taken up the study of this subject may possibly be explained by the very complex technique involved in taking the index and preparing the serum. The fact that it would take so much time and study has probably deterred a good many from undertaking any experiments.

In discussion, the bifluoride of ammonium has been mentioned, and in passing, I would like to say just a word. In the past three years I have found more real satisfaction and enjoyment in my pyorrheal work than I ever did before, and, incidentally, I trust my patients have received better results. The reasons are, first, because I know more about the trouble; second, because I have better instruments, and third, because I have bifluoride of ammonium with which to follow my instrumentation. Operators who are not using this preparation are missing the aid of a very valuable agent.

The society is to be congratulated on having received such an interesting paper, which in its clearness of thought and unbiased conclusions, is quite characteristic of the author.

*Dr. Merritt*—In reporting to The Institute my experience in the use of vaccines in the treatment of pyorrhea, I ask that it be accepted for just what it is worth. Those cases treated by this method and shown in my office this afternoon, were typical cases of pyorrhea of an exaggerated type, which had not in my hands yielded to local treatment alone. They responded to the combined treatment, and those of you who saw them will bear witness to the good results obtained.

Dr. Vaughan questions whether the better results may not be ascribed to improved technique. That this may have been a factor I have no doubt, as since the use of a local anaesthetic in the treatment of bad cases, I am conscious of performing more thorough local operations, but I do not believe that this entirely accounts for the better results obtained.

I am glad Dr. Potter called attention to the value of massage in the treatment of such cases. I do not believe we place enough emphasis upon this feature of the treatment. As a prophylactic, I believe it to be one of the most valuable agents we can employ, and as supplemental to, and following curettment, much more rational than the use of mouth washes.

Dr. Moffatt evidently misunderstood me in thinking I gave no attention to the general hygiene of the mouth before beginning the treatment of pyorrhea. The first thing I do in such cases is to thoroughly cleanse the teeth, removing the salivary tartar, etc., that the mouth as a whole may be as clean as possible. I do not consider this treatment for pyorrhea, as I pursue this course in any case. What I meant to imply was, that I limit the curettement to the number of teeth that I feel I can complete within the time reserved, my purpose being not to interfere with the process of healing by repeated curettements. If, at subsequent visits, there is no further discharge of pus, and the gums show improvement, except for applications of iodine and the polishing of the teeth, I give to them no further treatment.

Replying to Dr. Tracy, I would say that it is my custom in all cases where curettement is attended by pain to employ a half of one per cent. solution of cocaine, which I inject into the gums about the teeth to be operated upon. One-fifth of a grain of cocaine to twenty minims of normal salt solution makes a very satisfactory anaesthetic and one the effect of which will last long enough for the most extended operation of this kind. By this method all pain is eliminated from the operation, and the knowledge that one is not inflicting pain, lends deftness to the hand and insures a more thorough operation.

To the objection some time urged against the use of anaesthetics, that they act as irritants to a tissue already below par, I want to say that while theoretically this would seem reasonable, there is no clinical evidence to support such an hypothesis. Cases thus treated respond quite as quickly as those where, because the patient was not sensitive to pain no anaesthetic was used.

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## THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, January 4th, 1910, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The Vice-President, Dr. S. H. MacNaughton, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the previous meeting, which were approved.

## COMMUNICATIONS ON THEORY AND PRACTICE.

Dr. John T. Delaney showed a patient whom he had treated for a fracture of the maxillary bones and read the following history of the case:

Dr. John T. Delaney: This case came to me in Bellevue Hospital and has been under my observation ever since. The patient, Mr. T., while flying a kite on the roof of a five story building fell to the cement pavement, sustaining a fracture of the left tibia, fibular, femur, right radius, nasal and two maxillary bones.

The inferior maxillary was fractured at the symphysis and between the first and second molar on the right side and the second and third molars on the left side. An examination of the superior maxillary bone showed considerable false motion of the alveola process. Most of the teeth were exceedingly loose, the upper right second molar being displaced so badly that it was considered advisable to extract it.

The injury of the face was accompanied by a generalized swelling about the cheeks and neck which made it impossible for the patient to open his mouth to any great extent and rendered the taking of an impression impossible. After three days the swelling was partially reduced and impressions of both jaws were taken.

Casts were poured and broken at the places of fracture, articulated and waxed together.

Dies and counter dies were made of both jaws and splints of silver constructed. The upper splint was then cemented in place and the stress taken from the fractured process by means of double elastic straps attached to wires which had been soldered to the splint and buckled to a close fitting leather cap, which was placed firmly upon the head.

This appliance proved to be very successful; it enabled the patient to breathe and eat comfortably, allowing full motion of the jaw.

Owing to the union of the bone in the upper jaw being more rapid than that of the lower, the splint was removed some weeks ago, and, unfortunately, misplaced.

I, however, constructed a duplicate which will be shown. When the splint for the lower jaw was adjusted it was held firmly in place until the cement hardened, by three large cotton rolls

being placed upon the masticating surface of the splint and a tight barton bandage was applied.

After an hour the bandage was removed and the patient allowed free movement of the lower jaw, which was a relief owing to the fact that the fracture of the nasal bone forced him to breathe through the mouth.

His recovery was not totally uneventful; a week after the splint was put in position the patient developed an abscess at the symphysis due to a piece of necrosed bone.

The necrosed piece of bone was removed, drainage established through the original wound and the treatment consisted of potassium permanganate irrigations and gauze drain.

This was dilatory in character and was probably due to general weakened condition.

The splint for the superior maxillary was removed at the end of five weeks and complete bone union had taken place.

It will be noticed that the wound on the chin has not closed. I have not removed the splint from the inferior maxillary owing to the abscess which developed. I feared that union had not taken place.

*Dr. H. W. Gillett*—I present a new drill that was called to my attention nearly two years ago by Dr. Belyea, of Brookline, Mass. I believe it to be Dr. Belyea's invention and that he has decided not to patent it. They run much more smoothly than the ordinary drill and are excellent for drilling amalgam and dentin, but of little value in drilling cements.

Tantalum instruments for use with our silicate cements are new and some of the new shapes are interesting, particularly the thin spatulas. The material which is used is the same as in the tantalum lamps. I am told none of the acids except aqua regia, will corrode the metal.

I also want to read a short paragraph passed to me by a physician, which has two or three points of interest. It is of interest as one of the evidences now growing so common, of the drawing together of the medical and dental professions, and their realization of their common interests. It also had for me a very hearty laugh in it, and I would like to read it, with the President's permission, to see if others find the laugh in the same spot. This is clipped from the "Medical Record" of December



25th, 1909, and quoted by them from the "Lancet" of December 6th:

LOCAL SEPSIS AS A FACTOR IN RHEUMATISM AND GOUT.

C. W. Wirgman and H. W. Turner pay special attention to the subject of pyorrhea alveolaris. They have not found a single case of either rheumatism or gout in which local sepsis was not in evidence. Sometimes adenoids and tonsils may be a manifestation of this fact, but pyorrhea is always present. They describe the following types of this lesion: (1) The superficial inflammation around the teeth in ill-kept mouths, which when once restored to a healthy condition can be kept in order by the patient's own efforts. (2) Pockets between the gum and tooth and osteitis of the bony sockets found on examination in apparently well-kept mouths. In nearly all these cases a characteristic odor can be detected. The patients frequently complain of some alteration in or loss of taste and of tenderness and aching of varying intensity, due to exposure of dentine. (3) The genuine pyorrhea, acute or chronic, when pus can be squeezed from around the necks of infected teeth. (4) Dry osteitis, with absorption and recession of gums, which very frequently merges into the third form, and (5) and combination of the foregoing. If in a case with gouty or rheumatic tendencies we can discover these septic conditions early enough, before the general symptoms have developed, we may be able to do them an immense service. If we believe that a diseased joint is due to an organism settling there, there are two future possibilities: (1) That after setting up inflammation the germ dies and there is no further trouble unless a fresh invasion occurs, and (2) that the primary inflammation quiets down because of the attenuation of the virus or from other causes, but the microbe, having effected a lodgement, bids its time, and multiplies locally, causing a chronic inflammation. In mixed infections the vaccine treatment does not appear to be of much service. Long-continued treatment is necessary in the cases presenting gum lesions. A cure often results by dropping out of the teeth."

As the last statement was greeted with laughter, Dr. Gillett remarked that the gentlemen had found the laugh in the same spot.

Dr. Gillett then read a paper entitled: "The Present Status of the Gold Inlay."

(For Dr. Gillett's paper see page 109.)

DISCUSSION OF DR. GILLETT'S ADDRESS.

*W. B. Dills*—I have enjoyed the paper very much and consider it an honor to be called upon. The work shown us tonight by Dr. Gillett is splendid.

Dr. Gillett spoke of some bad inlay work he had recently seen and I have inspected some lately which seemed to be about as poor as it could be. It is the same with gold fillings, but I think even with poor workmanship more teeth are saved with the gold inlay than with gold fillings. That I think is due to the use of the true filling material: cement. I have seen some porcelain inlays where a large fissure existed between the porcelain and the enamel, into which an instrument could be placed, but underneath, it was nice and sweet, kept so by the oxyphosphate.

I do not feel that I can employ the direct method and get as good results as by the impression method, and I do not believe anyone else can though I have seen some very nice work done from the direct method. To me it seems a hard job to put wax between the cervical margins of the bicuspid in some cases. I cannot do it, and I do not try to.

In regard to the wax, I like Dr. Taggart's wax for carving; but lately, I could not get it, so I used the Dental Supply Co.'s wax, and I think it is better as it does not flake off so much. I do nearly all the work on inlays myself, not trusting it to the mechanical man. I do not find it necessary to put it in an articulator—I think it is a waste of time. I have the occlusion and the approximal contact with the other tooth, and if the wax has not gone to the very surface, I draw it down by heating the spatula, and then carve it up.

I think the different methods have been covered by Dr. Gillett. I have no gold inlays here, but I have some carvings that I would like to pass around. Here, also, are some old dies that I picked up out of my box, and some that are ready to cast to-morrow.

*Dr. W. B. Dunning*—Dr. Gillett and Dr. Dills have carried the technique of inlay making far beyond anything I have

attempted. Of course, I have been interested in this work, and have followed it up in a general way since the Taggart demonstration.

With regard to the two methods, I confess I have cast more inlays with the direct method than with the impression method. I do not seem to find the difficulties Dr. Gillett and Dr. Dills have mentioned. It seems to me eminently simple to soften a piece of black wax (easily seen in contact with the white tooth), to press it as far as possible into place, to get the patient to bite, and there to mark the proper occlusion. If the wax is crowded into the interproximate space, it is a simple matter to carve out enough of the wedge to allow of the removal of the core. It is a matter of personal practice. I have had little difficulty in making the most complicated cores in this way. There is just one thing in regard to the consideration of these two methods that has occurred to me. In connection with the impression method, I have noticed that when the case is one involving three surfaces—a mesio-distal—occlusal-cavity—for instance, as in the case of one of Dr. Gillett's models now being passed about, if the laboratory man makes the slightest error in placing that amalgam die—if it is a thousandth part of an inch out of the way—when the plaster is run the amalgam die may lean too much mesially or distally. When it comes to making the wax core, that will have an over contact on one side, and will be deficient on the other. That may make a tremendous difference for the operator when the finished inlay is sent to the chair. I speak from experience, because not long ago I spent over an hour grinding down an inlay having an excessive distal contact, which, of course, did away with the mesial contact. It meant seeing the patient again. If it had been done by the direct method, I should have drawn out this staple-shaped piece of wax—without distorting it, the contacts would have been perfect, and the inlay, when returned, would have dropped into place. I believe so, because I have frequently performed the operation in that way.

The rubber wheels Dr. Gillett has shown are most excellent. I know of nothing better for producing rapidly a fine, dull finish on metal.

With regard to one little point, namely, the roughening of the under surface of the inlay to afford a better "grip" for the

cement, I feel that it is well, especially with a small inlay and not a hollow one, to make the surface as rough as possible before setting it, and a convenient way is to go over the under surface of the inlay with a sharply serrated plugger in the rapid mallet. I should like to pass around a little ingot of gold which has been roughened in that way.

This does not apply to large inlays, and especially those which are hollowed out, as those have ample anchorage for the cement; but where we depend largely on the adhesiveness of the cement, it seems to me best to have the surface as rough as possible.

*Dr. W. D. Tracy*—This is, indeed, a very interesting and important subject. It is interesting to me, because I have taken an active interest in gold inlays ever since the perfected system of making them was brought out. I think we all have been interested in getting a little inside light on the way Dr. Gillett is doing this work, because we know that no method is too irksome for him if he gets the results. One little statement he made I will speak of, so that it shall not be misunderstood. He said he was not willing to take his own or his patients' time to make the wax model in the tooth; but I am sure if he felt he could get a better result, he would take the time. He meant, I believe, that he gets practically as good results from using the impression method, as from the direct core. All who are fortunate enough to have an opportunity of seeing his work, I know will agree with me.

He spoke of the relative merits of the inlay and the foil filling. The best operators—some of the men who are capable of doing the best gold fillings we have ever seen—are those who have become most enthusiastic in their support of gold inlays, and it naturally follows that a man who does expert and perfect gold fillings according to the old methods would probably do the best class of inlay work. The reverse is also true—that a man who is satisfied with a sloppy, badly packed, half-finished filling, would be willing and satisfied to put in a bad gold inlay; but that is not a reason why the idea should get abroad that gold inlays are receiving a black eye, as the essayist has mentioned. Any operator who has neglected the details of his inlay work to a sufficient extent to make an inlay with a deficient contour, it seems to me ought to get the black



eye, and not the inlay; and I think that is how it will turn out in the long run.

In the beginning I was taken to task about my inlay methods and was told that a great many teeth would return with inflamed pulps. I admit I made some mistakes in my application of gold inlays in my early experience, as no doubt others have. In some instances I did have teeth come back from which I had to take out the pulps, and maybe some patients went elsewhere that I do not know about; but it did not take me long to see the necessity of providing protection for the pulps in one of the two ways we have at our command. One of the most effective ways is by making the inlay hollow, and it is my practice in all sizes except the very small, to hollow the inlay out, not only to avoid thermal shock, but to get a good hold for the cement. Consider a large inlay for the buccal surface of a molar, a cavity with simple outlines. The inlay going in there could come out in the same manner, but by hollowing the inlay a large under cup would be formed, and a large mass of cement between the inlay and the pulpal wall would be an advantage.

I was surprised to hear Dr. Gillett say he had given up the Roach impression trays. I would not want to be without them. With a blunt nose scissors and a pair of pliers I can fit these little cups to any tooth where an impression is needed.

The way I manage is this: After I fit my little tray over the individual tooth, I put a small quantity of the Detroit Compound into the impression cup, and hold it under the cold water until the whole mass is chilled. Then it is held over the Bunsen burner to soften the surface, and a little vaseline smeared on the compound and in the cavity, and pressed into place. The hard compound underneath carries the soft compound on the surface to all the little inequalities, and gives a sharp margin. If there is any doubt about the sharp margin, withdraw it, and do it a second time. I never had so much satisfaction in this work as I have since I perfected my method in the use of the Roach impression cups, and I advise all who have not tried that way to do so before throwing them away or deciding to get along without them.

The rubber disc has had the endorsement of other gentlemen. It is one of the big little things that help us so much.

After they get worn down to small dimensions, they are often serviceable for polishing small inlays in the mouth; but their greatest sphere of usefulness is in the rough finishing of the inlays.

Some dentists have said "Your inlay is no stronger than its cement margin," and that is true; but with a properly fitted inlay, the cement becomes a small consideration. It has occurred to me that if, as we know, the very poorly fitted, badly adapted porcelain inlays put in years ago have withstood the action of the secretions and the stress of mastication on exposed surfaces for from five to fifteen years—that is about the width of my experience in observing inlays—how much longer will a beautifully adapted, well-finished gold inlay last? Is it not reasonable to expect it will outlast the others, where the seam is almost microscopic, and a fine explorer can be passed over it without tripping?

I think I am justified in hoping for good results from my inlays. I think an inlay put into a weak bicuspid will do my patient more good than the best packed gold filling that could be put in, under the most favorable circumstances. The most careful operators have been defeated in their very best efforts by the structure of the enamel. They cannot always seal their margin perfectly and get a permanent result. The damage at the time it occurs may be microscopic, but it has its effect, and eventually the filling suffers from that original defect. Those defects should not occur to the same extent in the gold inlay. I presume it may be possible in hammering in gold inlays to crack the enamel where we do not see it, but I have never split a tooth microscopically, in my manipulation of inlays. If I think there is danger, I will take steps to protect it, so it will not split.

Dr. Gillett showed a bicuspid with an anterior and a posterior compound inlay. In managing that class of inlays I would cut off the point of the inner cusp and build the gold out there, because I consider the stress is at least removed from that inner cusp by the metal and it means no more display of gold.

Dr. Gillett's explanation of the inlay that goes in in one direction and comes out in the same direction is a very lucid one. If they are properly keyed in, with due regard for the mechanical principles under which these inlays are made, it

seems to me that every time the patient bites that force tends to seat the inlays more firmly rather than to tip them out.

If an inlay gets loose, it is very apt to come out, and if it is going to be loose, it is a good thing to have it come out, for then the dentist will know it has failed. On the other hand, a very nice looking gold filling may be going wrong and deceiving both dentist and patient.

There was one thing Dr. Gillett did not mention in speaking of the virtues of the inlay. In cavity preparation in the past some of us who endeavored to do good, radical gold work, sometimes felt a certain hesitation about cutting away tooth structure—I know I have myself—structure that should be cut away for the permanency of the operation. Every small part that was cut away meant fifteen minutes or more in packing gold, and a strain on the patient, and I used to hesitate often about cutting away the cusps for contour fillings. But now I do not hesitate about that, and I have outgrown that extreme reverence for tooth structure that I was taught to have, which led me often to leave portions that should have been cut away. I think a reverence for tooth structure which makes a man neglect proper cavity preparation is not justified. I would not convey the impression that I have not a proper regard for the shape of the tooth, but I think the ultimate condition and usefulness of the tooth is what we should consider, and not merely the present beauty, or the patient's comfort at the time of the operation.

Dr. Dunning spoke of the comparative difficulty of working with the direct method and the impression method. He said he found no difficulty in making the wax core. I am sure that is true with him, but I have found difficulty with it. To get a wax core on the back of a tooth, when the patient is restless and where the gum is bleeding, is not so easy. In simple cavities where the work is accessible, and all the details simple, I find great satisfaction from making a wax core and casting it direct; but in compound inlays, and inlays that go under the gum margin, I find satisfaction in taking the impression, and by having the compound partly hard, one can get a clear outline.

Dr. Dunning also spoke of the possibility of error in putting the cast back into the wax impression. There is possibility of error in all steps of this work, but if they are carried out

with due regard for accuracy of detail the percentage of successes should be large and failures few and far between.

It is a very interesting subject. I have been surprised to find men who are good operators, who do not make gold inlays, and I feel safe in saying that the dentist of to-day who has not taken up inlay work is not in a position to serve his clientele in the best possible way.

*Dr. Dunning*—I do not think I made myself exactly clear as to my view of the impression method. I said I had used the direct core method more frequently than the other, but I do see great advantages in the impression method, especially in making large inlays. There can be no doubt as to the excellence of the results shown us by Dr. Gillett.

*Dr. Herbert*—It gives me pleasure to state that after twenty-three years' experience with porcelain, and latterly with gold inlays, I can heartily support everything said to-night in favor of the gold inlay.

*Dr. Heckard*—Yes. Dr. Gillett put an inlay in a tooth for me, using the impression method that I was opposed to, but—I must first say, right here, hurrah! for Dr. Taggart! I have not stepped aside from Dr. Taggart's method of operating once, excepting this inlay in my own tooth. Everything Dr. Gillett says about his method is right, because I have the evidence of it in my mouth. I would not have gone to him if I had not had perfect confidence in him. We exchanged ideas on the two methods, impression and direct, as I sat in his chair and in his laboratory, after which he told me that he wished I would show my inlay at this meeting and hoped I would speak on "the other side" of the question.

I have been a "gold operator" all my dental life, using no amalgam and gold inlays have made the very hard cases easy. Dr. Gillett makes the impression method practical and as easy as the direct method by using the little disk and the packing back of it to hold it in place. I use in my direct method seamless aluminum bands. Having all sizes I select one the size of the tooth and trim it to allow a fit at the gum line and to allow the upper teeth to close properly—no matter how badly the tooth had been decayed I have four walls then for my Taggart wax, and it simplifies the operation.

Taggart wax is better in the investment than any I have



yet used, it passes away and leaves no residue behind. It carves in the fingers better than any wax I have used.

I have about twenty-five boxes of it left. I sent all over Brooklyn, Jersey City and New York City to buy in all I could find of it after Dr. Taggart stopped making it. To me it is the ideal.

From the orthodontia standpoint, I believe in cusps as we all do, but without the Taggart inlay did we have as many of them?

And while I am on the subject let me say I think that every dentist should take a post-graduate course in orthodontia whether he practises orthodontia or not.

The articular is a very important thing: The human jaws make the best one for each case, the condyles differ in each. Dr. Grant Mollyneaux gave the profession a beautiful paper on this subject a few years ago, and showed many cases where the condyles were not alike in the same jaw. So each human jaw has it's own particular movements in mastication. Therefore, I think that the Taggart inlay wax placed in the cavity in the tooth, bitten into and chewed a little, is best.

If it is but an approximal cavity, mesial or distal, I insert a bent spatula instead of the aluminum band, and hold it until the wax chills, remove the spatula, carve the wax, remove it and cast. Is anything easier than that?

In very large cavities, in teeth that a great many place gold shell crowns on, I make the double inlay and this makes the operation easy and consumes but little time. I prepare the cavity, press in the wax, taking care to push my finger into the wax so as to make it hollow. Sometimes I carve a big hole in it. I then trim it only at the margins, remove and cast it in pure gold. I then place this back in the tooth with warm wax on it, tell the patient to bite, remove from the mouth, carve and cast; the second casting may be pure gold, or an alloyed gold—but usually in such cases I use harder gold for the cusps.

Dr. Gillett asked me to say all I could against the impression method. While I haven't said a great deal, I am against it and for the Taggart method, and I am very glad to have this opportunity to stand up for Dr. Taggart's idea.

*Dr. Gillett*—There is very little to say in closing. I have

not had enough opposition—I thought I could stir up the members more than I did.

I want to thank Dr. Heckard in particular for mentioning Dr. Taggart and I want to apologize for not having done so myself. I think it is a disgrace to talk or write about gold inlays without mentioning Taggart. We owe him more than we can express. I use the Taggart outfit, and always expect to own one. If it gets superannuated, I will put it on the shelf and give it a pension. I will neither sell it nor give it away. I yield to no man in my admiration for Dr. Taggart, and what he has done for us, and I agree with Dr. Heckard in what he has said. I think Dr. Taggart has been treated most shamefully.

With regard to the point brought out by Dr. Dills, as to the mounting in an articulator—I mount in the articulator because it saves me time. My laboratory assistant is able to do better with than without the articulator. He has frequently sent me a pair of approximating inlays that could be dropped into their cavities, looked at and set without anything further being done.

With regard to making the wax core in the cavity, as Dr. Dunning suggested, it again becomes with me a matter of saving time. I do not think I spoke of that in my choice of method. By using the impression method I am able to have the laboratory man do nearly all the finishing.

Dr. Heckard tells me he is able to cast and articulate an inlay which needs almost no finishing.

As Dr. Dunning said, we need to use the same exacting attention for every little detail, with the impression as with the direct method. Unless the die and impression are perfect, and the die put exactly where it belongs in the bite there will be difficulty. Each step must be done carefully.

In conclusion, gentlemen, I want to say it seems to me that one of the most disgraceful things in our practice to-day is the class of inlays coming from the hands of men who are not taking that care. Inlays are capable of immense benefit to our patients, and for heaven's sake, let us make the right kind of inlays, and no other.

*Dr. Davenport*—I think, under the circumstances, our essayist, Dr. Gillett, is worthy of the same consideration that he would receive from us if he were not a member of this body. The chairman of the Executive Committee has told us that Dr.

Gillett has come in on short notice, and I am sure he has well filled the niche.

I move you, sir, that Dr. Gillett receive the united thanks of this society; also those gentlemen who have assisted in the discussion of this very important subject.

The motion was unanimously carried.

Adjournment.

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### THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, February 1, 1910, at the Academy of Medicine, No. 17 West Forty-third Street.

The President, Dr. J. Morgan Howe, occupied the chair, and called the meeting to order.

The minutes of the last meeting were read and approved.

#### COMMUNICATIONS ON THEORY AND PRACTICE.

*Dr. Louis Nash*—I have here models of five cases showing decided deformity due to extraction of teeth which the dentist ought to have tried to save.

The first three models are of children of one family. Of these, two have lost lower six-year molars, and the more than half-inch space between the lower centrals shows how an apparently inherited tendency to spreading of the teeth can be increased by the sacrifice of molar teeth. The younger boy, aged fourteen, has not lost the first molars, but the slight spacing between the lower incisors shows the spreading tendency I have spoken of.

Case No. 4, is that of a child of twelve years whose dentist had a specialist remove the lower first molars. Note the lack of development of both jaws.

Case No. 5, is that of a girl of 16, whose dentist probably obeyed her will, instead of his own, and extracted all upper and lower first molars and the lower first bicuspid. These teeth should have been conserved and retained. The upper jaw is undeveloped and is as small as that of a child of six, while the lower jaw might be taken for that of a middle-aged person who had never had dental treatment.

I show these cases to emphasize the need of the practitioner making every effort, both by argument and treatment, to

save teeth which only, in rare instances, should be sacrificed. The parents of these patients are all in good circumstances, and it seems to me the children have suffered from improper advice; for, had the importance of saving these teeth been explained, the question of expense would not have been considered, the children would have been lastingly benefited and the dentist's reputation for careful conservatism would have been considerably enhanced.

*Dr. H. W. Gillett*—Do I understand, Dr. Nash, that he considers the mutilation in the last case shown due to the advice of some dentist and does he feel that the circumstances of the child's parents and their attitude warrant the belief that better advice would have been followed?

*Dr. Nash*—That is true in all five cases. The parents were perfectly willing to stand the necessary expense in each case.

*Dr. Gillett*—Necessarily this has been done within the last four or five years, on account of the age of the patients?

*Dr. Nash*—Yes, within that time.

*Dr. Gillett*—In view of the disastrous results of such work, the question comes to my mind whether the time has not arrived when this and other societies should appoint committees to formulate some statement that shall effectually brand such behavior on the part of practising dentists as reprehensible; and also whether we can interest the extracting specialists so their influence may be on the right side.

*Dr. E. A. Bogue*—If Dr. Gillett will formulate that motion, I will be glad to second it.

*Dr. LeRoy*—I would second that, too; I think the suggestion is very timely. It is a serious subject, and one that needs considerable thought and discussion among men of understanding.

*Dr. Palmer*—I think that such action would meet the approval of the extracting specialists. I recently saw two cases which were sent to men who make a specialty of extraction, in which they refused to extract the teeth.

*Dr. Hyatt*—I am glad this suggestion has been offered. It seems to me the dental profession has at last come to a point in its history where there should be some united action taken by societies throughout the United States, protesting against such needless, and I might say, criminal extraction. Many distressing cases have come under my observation and it seems to me



some stand should be taken, so the profession, as well as the public, shall know the extraction of such teeth is malpractice. The sooner we correct the idea that a man has a right to use his own discretion regarding this matter in his own office, the better it will be for us all.

*Dr. A. L. Swift*—I think the promulgation of this motion would be welcomed by any conscientious extracting specialist, as it would relieve an otherwise trying situation. When a dentist sends a patient with a card requesting the specialist to extract teeth which he believes should be saved, he could refuse to do so, if such a resolution existed, feeling that he had the support of the best societies in the country.

The motion to appoint a committee to take this subject into consideration, and formulate a resolution to be acted upon at a later meeting, was then carried.

The President appointed Dr. Gillett chairman, and Drs. Swift and Watson.

The paper of the evening was then read by Dr. W. A. White, of Phelps, N. Y., and was entitled "What to Do, and How to Do It."

(For Dr. White's paper see page 128.)

#### DISCUSSION OF DR. W. A. WHITE'S PAPER.

*The President*—Dr. William H. Potter, of the Harvard Dental School, has favored us with his presence this evening, and I have the pleasure of calling upon him to open the discussion of this paper.

*Dr. William H. Potter*—What I say to-night is the outcome of the experiences I have had in the last three or four years, as director of the care of the teeth of the children in the public schools in the town of Brookline, and as a member of the Massachusetts Dental Hygiene Council.

It is very essential to have at command reliable literature dealing with dental hygiene. The Massachusetts Dental Hygiene Council, early in its existence, began the preparation of such literature, and one of the first publications resulted from a suggestion furnished by a member of this Society, Dr. Kimball. He presented to us, in Boston, a little tract upon the care of the teeth, and that formed the basis of a tract entitled "The Care and Use of the Teeth," which has had a circulation already of

over 100,000 copies. Later, a somewhat more elaborate treatise on the general subject of oral and dental hygiene was published. A report on the examination of the teeth of school children in the town of Brookline was prepared, which gave not only the results of the examination, but the methods employed.

We have also gotten out pamphlets of larger dimensions, in order to meet the demands constantly made for literature. Educators wishing to teach dental hygiene do not know how to go about it. If they can appeal to a body like the Hygiene Council they receive help at once.

We have found it desirable to have instructive lantern slides to loan. It is very easy to teach a subject by means of pictures. The lantern slide concentrates the attention of an audience upon the subject under consideration, and vividly impresses the lessons which it is intended to teach. Enlarged photographs are also very useful. There are places where slides cannot be used, as the lantern is not available. For such occasions, large photographs are absolutely essential. These enlarged photographs can readily be made from the negatives from which the lantern slides, are made and can be of such dimensions that they can be used for lectures, or can be hung upon school walls.

Children should learn with their A B C's the fundamental things, about tooth preservation. If suitable maxims and pictures are hung upon the school walls, and children early learn the essential things about dental hygiene, such knowledge will stay with them through life—and their teeth will benefit in proportion.

At the very beginning of its existence the Massachusetts Dental Hygiene Council established a dental hygiene exhibit. At first, it was very rudimentary, and poorly assorted; yet it at once made a decided impression. The public felt that it imparted useful information. The exhibit was gradually improved until it was thought good enough to be allied with the traveling tuberculosis exhibit, and was shown quite extensively throughout Massachusetts. In the fight against tuberculosis the condition of the mouth was considered a serious matter, and it was deemed important to teach that the mouth should be healthy, to fortify the patient against tuberculosis, or to help the tubercular patient to fight his disease. There was held in Boston last fall, the "Boston 1915 Exhibit." In that exhibit were collected

plans for making Boston an ideal city in 1915. Great importance was attached to all matters of public health. The dental hygiene exhibit was given connected with the good space, and a lecture upon the subject was furnished during the course of the exhibit.

In Boston there is no regular examination of the teeth of school children by dentists. There is a general supervision of the mouth by physicians and nurses. Many children are brought to the dental infirmaries by the school nurses for treatment.

In the Brookline schools, where for several years an examination of the teeth by dentists has been established, we have met the problem of the repair of the teeth of poor children by arranging with local dentists to treat children at their offices for a definite fee for an hour's work. The money for the payment of the dentists was raised by private subscription. Since the opening of the new building of the Harvard Dental School, an excellent service to the school children of the town of Brookline has been furnished. Not only are they treated by our students, but by practitioners who come to the school and devote themselves exclusively to children.

Something is paid for this service. I do not believe in free dental clinics, except for the absolutely destitute; something should be paid—if it is only 5, or 10 cents—for each operation.

I cannot close my remarks on this subject without speaking of two matters which I think ought to receive attention. The present popularity of the cause of dental hygiene lends itself to the advertising of the individual. This is a tendency which must be guarded against. In Massachusetts we have found that advertising dentists have adopted our literature, and circulated it in order to bring custom to their offices.

The tendency to overstatement is another matter of importance. It is better to understate our cause than to overstate it. If we overstate it, claiming that too many physical ills are due to a bad state of the oral cavity we are sure to meet with just criticism. The matter of physical development depends on a great variety of things, and the condition of the mouth is only one of them. We know it is important that the mouth be in a healthy condition. A modest statement will carry great weight; but an overstatement will weaken our cause.

*Dr. Thaddeus P. Hyatt*—I listened with a great deal of interest to Dr. White's paper, and it is rather hard to discuss

it. The subject is a broad one, and very important. Of course, I am going to make some suggestions that I do not believe have been made before. They may seem radical but nothing venture, nothing have, it is said.

First, I would like to refer to Dr. Potter's statement about exaggeration. I think there is a great deal of truth in what he said.

I do not believe we will get very satisfactory statistics, as regards the mentality of the child with good teeth or the child with bad teeth. When my father was alive, he was not a user of tobacco, but I was, and had been since I was nine years old. I started in early and expect to keep it up late. I used to take newspaper clippings to my father and say: "Father, here is a man who died at ninety-nine years. He took a glass of whiskey every day, and smoked four cigars a day." "Yes, my dear boy; but how much older he would have been if he had not done that."

But I used to get back at him.

It is the peculiarity of the individual, that is an uncertain quantity. Physicians know that some people who ought to die do not, and they also know that some patients who seem to have perfect health and strength, die before they ought to.

We know that a clean mouth is better than a dirty mouth. We know clean food is healthier than dirty food. We know that cleanliness, whether mouth cleanliness or any other kind, is good. We know that hygienic methods have helped to stamp out smallpox probably as much as vaccination did—at least, I think so. I think when we get a more sanitary condition in our lives in every way, it will be very much better for us, and I think the sanitation of the mouth is very important.

Of course, congratulations are due to Rochester on their dispensary. There are dispensaries in New York, and we hope to have one soon in Brooklyn; but after all is said and done, the dispensary can only do a very little of the work. Our great movement must be a preventative one, rather than a cure. It must be an educational movement, and that side appeals to me.

Those who have not been in my shoes for the last nine years cannot imagine what a great pleasure and satisfaction it is to me to hear these things. People used to say about me "There goes a public educator—a crank." I have changed my



views to this extent—that I believe we should educate the dentist and the dental societies. I think it would be a great factor in the work if societies would draw a set of resolutions saying they stood for such work, and that all work of this kind should be under the auspices of societies. There would then be no fear of men using this as a means of advertising.

I believe a set of resolutions should be drawn by this Society in regard to this matter, be printed in all the dental magazines, and published in the public press, so the public may know that behind the individual dentists stands the profession as a whole. Those who have not considered that may not agree with me at first, but the more the point is considered the more all will realize that that will encourage and help the men who are in the advance of this movement.

Then I think the dental societies should appropriate a certain sum of money to be used for the purpose. The New York State Society has a committee on dental hygiene. I believe this Society should appropriate a certain sum of money and give it to that committee for their purposes. That would show that this Society heartily supports that movement.

Dr. Potter spoke about the medical profession. We need to educate the medical profession so when they examine a patient's mouth they will not confine their observations to the tongue alone. It was a source of great gratification to me when a physician, who has been a patient of mine for some years, told me he is now examining the surrounding tissues of the mouth as well as the tongue. It was gratifying because I have been trying to educate that man on that point. We should educate the medical profession, because they very seldom look farther than the tongue, unless they are looking for diseases of the throat or surrounding parts. We may readily guess what deplorable conditions the majority of them would find.

When I was in London about two years ago, I called on a physician, who, after paying a great compliment to American dentists, told me they had convinced him of the importance of the mouth in relation to the general health. He brought out several mouth mirrors, he had a head rest, and he said if on examination things were not right, he sent his patients to their dentist with a letter saying conditions were not satisfactory. If they did not have a family dentist, he would recommend one.

We want to educate the medical profession so that in the medical colleges they will impress upon the medical students before they graduate the importance of oral hygiene. We must have the co-operation of the medical profession in this work.

Then I would suggest that steps be taken to enlist the services of the American National Red Cross. The Red Cross of America is doing a tremendous work trying to stamp out tuberculosis. I do not suppose there is any one in this room who has not purchased some of the Christmas stamps. The money received from this sale is used for the fight against tuberculosis. The dental clinic established in Brooklyn is practically under the auspices of the Tuberculosis Committee of the Bureau of Charities, and the gentleman in charge of that is a member of the National Red Cross. That society is under the supervision of forty-four governments of the world. Every four years they have an international convention, and it was owing to the resolution adopted at the convention two years ago that these campaigns against tuberculosis were started. If we can get in communication with them, and impress upon them the importance of oral hygiene in connection with tuberculosis, or by itself, we would be able to accomplish much.

I would also suggest the education of law-makers of the city, of the State and of the nation, to the end that when the Department of Health is established at Washington, recognition shall be given to the importance of this question. I am a member of the American National Health Association, which extends all over the country, and they issue a bulletin; but up to the present time I have not seen one solitary word about oral hygiene. I do not want to exaggerate—I simply state my own conviction; but I believe that oral hygiene is more important than the tuberculosis question. I believe if we can get a nation with clean mouths from childhood to old age, will stamp out nine-tenths of the tuberculosis without other help. I believe that this work is exceedingly important, and I do not believe the majority of dentists appreciate its importance.

I would suggest that steps be taken so that laws shall be passed prohibiting children whose mouths are not in good condition attending public school. I believe that is the only way to manage that.

No one not holding a dental degree should be permitted to

make examinations of the dental condition of the school children. In Germany, while they have but few dentists appointed, they do in some of the cities have laws that children must have their mouths in perfect condition before they can attend school and the children who cannot afford to pay are attended by those who look after that work.

After that education I think we can take up the question of education of the mothers, which Dr. White referred to, and last of all, the education of the child.

I would bring that last instead of first, because even if the child be educated it goes out into the world that has so little respect and regard for dental conditions, and loses the impression it received in early life; but if all these other conditions are met first, and the child is then educated and goes out into the world, finding those conditions carried on as they should be, it will realize it has been taught a subject of vast importance, and will persevere along those lines.

Naturally, I advocate with Dr. Potter the illustrated talks for educating the children. That is the simplest and easiest method to entertain and instruct them. I also think we need a text book on the care of the teeth, written in simple language, so children may be able to understand it and read it themselves.

*The President*—I will now call upon Dr. A. L. Swift, professor in the New York College of Dental and Oral Surgery.

*Dr. A. L. Swift*—I did not have the pleasure of reading Dr. White's paper, and as the essayist has so thoroughly presented the subject, it really admits of but little discussion. I have been interested in this subject for many years, and I must confess that the more meetings I attend of the different societies and of the Hygiene Council, the more I am impressed with the magnitude of this work which the dental profession has in hand at the present time. I am also impressed with the urgent necessity for great care and consideration as to the manner in which this work should be carried forward. We might go on talking for years and we should constantly have new phases of this subject brought up for our consideration. The field seems to be limitless.

I believe it wise to follow somewhat the movement of our friends in the Massachusetts Council, profiting by their experience. I was very much interested in the remarks of Dr. Potter.

They conveyed some very good ideas in reference to our work in this State. I thoroughly believe in the education of the public as to the necessity for oral hygiene. We must look to that as the first and most important step along this line; but as I have said many times before—I believe we must keep harping upon the necessity of oral hygiene to our brother practitioners who are not giving this work all the thought they should. I think there is room for education right in our own sphere.

The Hygiene Council of New York has made some advancement. They have decided that the best entering wedge in this work is through the public schools, and with that in view have addressed a communication to the Board of Education, asking permission to have dentists make an examination of the mouths of children in the schools, making duplicate charts, one chart to be sent to the parent, stating what work should be done.

We have also suggested to the Board of Education that the Hygiene Council would place at the service of the Board dentists who would undertake to do what was necessary for the school children at a uniform rate of charges, these men to be recommended by the Council. We have decided to take care of this work among the poor people. We have the promise of the Children's Aid Society to thoroughly equip every one of their schools with dental chairs and apparatus, if the Council would furnish the dentists to do the work. Now we have all the work laid out before us here in New York in direct lines—the promise to furnish the material and equipment—if the Council can furnish the dentists. That seems to be the hardest part of our work—to find practitioners who will give their time regularly to take care of these children who so much need the work. It seems to me the main duty that lies at the door of each of us is to do our share of the work. The Hygiene Council has also appointed committees to bring this matter before the societies to get their co-operation in securing dentists to do the work of these clinics. It is simply up to the dental profession now to make good and furnish men who will do the work. We have any amount of work which is absolutely necessary, and we have the promise of those twenty clinics which can be equipped at any time the Council can promise that they will supply the necessary men. It seems to me it is a wise plan to go slowly in order to be sure of our ground, and the main thing is to interest the different dental



societies and get their co-operation and support. The duty of the Finance Committee will be to raise the necessary funds to carry on this work. I do not think there will be any difficulty in raising the funds; the main difficulty is to get the dentists. We must manage in some way to equip the clinics with one or more superintendents who are to be paid something and then get the younger men to come in and do the work.

We need to be careful and conservative or we will fall into the errors referred to by Dr. Potter; I am anxious to see that this work is started out on a proper scientific basis. If every dentist in the State of New York should volunteer to give two hours a week, or even two hours a day, they could not begin to take care of the work that is waiting at our doors in this big city.

The different phases of the question which are constantly arising are perplexing and far reaching.

*Dr. Wheeler*—I think Dr. Gillett is interested in Dr. Tracy's clinic. It is a very useful institution, and we do not know enough about it.

*Dr. Gillett*—I have no direct knowledge concerning it, except that it was one of the first free dental clinics installed in New York City and is doing most excellent work.

*Dr. Wheeler*—Dr. Brennan, who we all know, and who expected to be with us this evening, is a physician and president of the Board of Directors of Bellevue Hospital. I think Dr. Brennan's position on this question proves that all physicians do not need to be educated concerning the importance of dental hygiene. I think also that active business physicians as a whole are inclined to leave this matter to be settled by the dentists according to the best light they have and I do not think we need to anticipate antagonism from them on anything that is reasonable.

Of course, we have sometimes been a little over-enthusiastic. Some of the daily papers which are intensely interested and sincere, but lack even primary knowledge of this question, do make statements that bring us into ridicule. They remind me of a lady, a Christian Scientist. Among her possessions was a tabby cat who, in the course of time presented her with nine kittens. She informed her friends of the fact, and further said: "You know the little things were born blind, but I demonstrated upon them, and in a week or ten days they all received their sight."

A good many of the statements we hear are like that, and we

will have to bear with them, I suppose, as long as our enthusiastic friends put these things in the public press without being viséd by the dental societies.

The dental societies of necessity must attend to all things which are of itnerest to the dentist, and to ask any dental society to give more than one meeting a year to this subject would be unfair to the men who have something else to present. So, in a quiet way, these things have been established here. To-day, through the efforts of this Council, the Board of Education is considering a proposition which, if accepted, will be the means of starting examinations of the teeth of the children in the public schools. The present Health Commissioner also has suggested that if we would appoint a committee of responsible men he would be glad to consult with them in regard to anything pertaining to oral hygiene, if it came up before the Board of Health; so the dental profession, as far as it is capable, will be consulted by these various important boards.

The same is true with the hospitals. Bellevue Hospital has three chairs and about thirty dentists appointed on the same terms as the medical men, and in 1909 we had over 2,000 operations in the Dental Department of Bellevue, with over 1,500 sittings, and over 1,000 patients have been attended to. I understand that like dental equipment is now being purchased for Harlem Hospital, and Fordham Hospital, I think, will come next, so with the Children's Aid Society, and the various hospitals and other institutions that are interested in the physical welfare of the public, there is a decided tendency to give the dentists all the responsibility they are capable of receiving. It is a work of slow growth, so I agree with what Dr. Potter said about overstatement.

I believe the statement made here to-night by a gentleman of great ability, suggesting that the child should not be allowed to enter school until its teeth are in good order, would not be a good plan to carry out. Think of the logical result of that. Because a child has a physical disability, it should not be refused the opportunity of improving its mental condition. I think that would not be approved of by the dental profession at large. We should think of all those things when we come before the public.

*Dr. Hyatt*—I should like to reply to Dr. Wheeler because all know that Dr. Wheeler and I are interested in this work with

all our hearts. I took the greatest care of my children from the moment they were born, and in fact before they were born, and they are as healthy children as can be found. Was I allowed to send them to the public school to benefit their mentality, until they were vaccinated? Am I asking anything less logical when I suggest that a law be passed to stop children with foul mouths going to school—to insist that the parents should put those little mouths in clean and healthy condition before they be permitted to enter school to improve their mentality?

I appreciate Dr. Wheeler's timidity in the matter, but I do not think we should take cognizance of that timidity, if we are sure of our ground. I am sure a child will be more successful with study if it is able to masticate and digest its food properly. I consider that my position is the more logical and should have the support of the dental fraternity.

*Dr. Gillett*—Right at this point may I give a suggestion that may bring the two gentlemen nearer together? Dr. Hyatt is looking forward to something that may come. Dr. Wheeler is thinking of present conditions and his contention would probably be perfectly true if we attempted to enforce any such rule next week or next month. On the other hand, Dr. Hyatt's contention is entirely reasonable. If the conclusions we, as dentists, feel positive about can be demonstrated to the public, and the medical profession—the suggestion Dr. Hyatt makes will follow as naturally as daylight follows darkness. It will not be a matter of compulsion on the part of the authorities, but of demand on the part of the public. It is, I think, plain to us that defective mentality necessarily follows some of the defects we find in the mouths of children, and if they are permitted to go to school with those conditions, we are unquestionably wasting effort and some of our money that might better be concentrated upon the children who are in condition to go to school.

It is a subject of interest to all of us, and it is being agitated all over the country. I have just returned from Chicago where I considered it a great privilege to have the opportunity to pay my compliments to Dr. Black at the banquet that was tendered to him; and incidentally, while there, I heard an address by Dr. Evans, who has charge of the medical inspection in the Chicago schools, which was well worth the trip to hear. I wish everyone here to-night might have had the privilege of hearing that

address. It tallies with the report we have had from Boston concerning Dr. Potter's work, and what we are hearing concerning the work going on in New York. As a result of that address there is already an effort under way to get definite evidence that may be put before medical men and the public to show what is possible to do in these cases.

One of the suggestions Dr. Evans made was to take a number of defective children from the schools, and distribute them among competent dentists, where they would have thoroughly good care for a series of years, and watch the results. In a small way that has started in this city, and the opportunity will be given for men who are interested in this work, and who feel they cannot give the time to attend the clinics, to do something of that kind. The results that can be demonstrated in this way it seems to me will be very valuable. The statement Dr. Wheeler makes that we are not going to meet with opposition from the medical fraternity goes only part way. We will not meet with opposition from them when they are convinced that we can—to use the slang of the day—"deliver the goods." I believe a demonstration under proper auspices of what can be accomplished for children, defective, presumably, because of conditions in their mouths—children selected because that is the most evident defect in their physical condition, and the demonstration carried out by placing them in the hands of competent practitioners who shall give them the same attention that they give children who come regularly under their care; having their condition and their school reports with all details tabulated for one, two or five years, will result in such an overwhelming demand that we will not begin to be able to meet it. If all the dental practitioners in New York to-morrow would drop every bit of work they have on hand and attempt to care properly for the mouths of the children of this city who are not having and cannot have, under present conditions, dental attendance—they could not begin to do it in three years.

*Dr. Hyatt*—All of the dentists in the United States could not do it.

*Dr. Gillett*—Well, we are drawing these things conservatively. Dr. Hyatt says we cannot fathom these things by statistics, but I am not quite so sure. It seems to me we have not done



so, but whether we may not by such a course get an accurate estimate of what may happen, is another question.

Besides this question, there is another one—after those mouths have been put in good condition, how are the children going to be taught effective use of them? Effective mastication? There is a great untouched overwhelming problem, which I leave for all to think of.

*Dr. Wheeler*—In answer to my friend, Dr. Hyatt, I would like to say that smallpox is a contagious disease. If a child desires to go to a public school and cannot afford to be vaccinated the city furnishes a physician gratis; but the city furnishes no dentist to put the child's teeth in order.

*Dr. White*—I have but little further to say, but it seems to me, judging from the comments that have been made, that the successful issue of the question is education. That I think has been fully established.

There was one question Dr. Swift spoke of regarding the manner of raising funds for paying the expense of conducting the dental clinics. In Rochester, the Society issues a little journal—their full report. Through distributing this report voluntary contributions towards sustaining these clinics, and paying the dentists in charge a fair salary, have been received. That has come without solicitation on the part of the committee—all through reading these reports. The clinics were only kept open three days in the week at first but now they are open every day, and the dentists get a good salary. They hope soon to establish other clinics, and by educating the Board of Education, which they are trying hard to do (Laughter) they hope the Board will take into consideration the wonderful results that have been accomplished, and make sufficient appropriation to include the salaries for conducting the new dental clinics.

In regard to teaching oral hygiene in the schools, I will say that at home they passed a resolution to include hygiene in the curriculum of the schools—not only oral hygiene. There is a book issued which I think is the only book of its kind, which has been adopted by our Board, and until we can find something better, we will include that in our curriculum. It is a small book, and is in such simple form and language that child five years old can comprehend it. I did not come here expecting to teach any-

thing new in regard to oral hygiene, because all know what it means.

I am grateful for the attention which my paper has received.

Dr. Wheeler moved a hearty vote of thanks to the essayist for the presentation of his paper. The motion was unanimously carried.

Adjourned.



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### DENTAL ECONOMICS. ONE VIEW POINT.

In sympathy with the times, and with various other editors who have discussed this topic, the writer presents his views of man's dental needs and the goods and services which satisfy them.

Some editors discuss dentistry from the standpoint of art for art's sake. Others study how to add to good work such additional utilities as superfine furniture, social prestige, superior attendance, stationery, location, harmonious atmosphere, etc., in order to exact relatively higher fees based on the higher cost of such service, the limited amount of such service which may be produced, and the desire of the wealthy for the distinctive and rare. High fees and higher fees is usually the ultimate appeal of most writers on the business side of dentistry. The narrowness of the first class of writers, who do seem to realize the vast need of the world for our services, which could be multiplied in volume by a fraction of the diligent study which the business man applies to his production and distribution of goods for mankind's use, and the lack of historical perspective on the part of the second class, who fail to realize that machinery and system have added to mankind's happiness because they have created vast quantities of useful goods for man's use at a fair price which he is able to pay, do not obscure my vision.

I see the dentist as a producer of economic goods, whose utilities satisfy a demand from consumers. To him the observed laws of economics apply. A systematic study of dental economics



in dental schools, and in dental societies would result in his greater service to humanity, through lessening of waste and emphasizing the important. The service of mankind and the happiness of the dentist demand alike that the great mass of dentists serving the people with necessary dental operations, shall have adequate instruction in the distribution of these services, as well as the production. For such a course the writer would suggest lectures in:

General Economics.	Accounting.
History of Industry.	Increasing Production.
Dental Economics.	Avoiding Waste.
The Dentist, his Equipment,	Buying.
his Operations.	Collections.
Bookkeeping.	Investment.

Such knowledge will raise the average dentist to wider usefulness, financial independence and a broader look on all life's problems. "The happiness of the great mass of mankind is the goal of the philosopher," says Professor Charles Eliot. "The rich and famous are too few to affect appreciably the sum of human happiness." If dental work is worth while then increasing its amount by application of business methods is surely worth while to the public.

A few brief illustrations will show how consideration of the last eight divisions suggested help the average dentist.

Machinery and equipment cost the first investment, operation and repair, and replacement when worn or obsolete. Not subject to wage expense, fatigue, sickness or sudden resignation. The most complete equipment will pay any dentist many times more than any safe investment.

Standard goods should be bought in large quantities. Five hundred dollars invested here will pay 100% per year, by being turned over several times.

Labor is the greatest expense of any practice by far. His own is the highest wage, and the care of his office, his book-keeping, his correspondence, his errands, his banking, his telephoning, etc., are more economically done by an assistant. All vulcanizing and finishing and most laboratory work, according to system and individuality of the dentist, should be turned over to a

good assistant or laboratory unless the dentist prefers to specialize in prosthesis. Wages is the reward paid to labor for its share in industry. The dentist should earn not only wages of production, but wages of management and wages of distribution.

The dentist should do what he excels in, and let assistants do the rest. This lessens the wage expense of each operation, and increases the net profit. By thus saving time and strength the dentist is enabled to give patients attention on short notice, to accomplish more work in the time the patient spends in the office, and to consider those niceties which attract patients.

Arrangement of appointments requires that when possible, the difficult operations should be done in the early forenoon, when fatigue and interruption is less. Doubtful appointments should be preceded by sure ones, to permit overlapping. It is safe to reserve only short periods for patients careless of appointments.

Prompt, accurate bookkeeping. This records all work and fees, favors prompt settlement of accounts, explains misunderstandings, shows the dentist weak spots. Accounting and analysis of expenses, losses and profits, furnish the data for scientific analysis of the business side of the practice. The up-to-date business man pities the old-timer, yet the latter is ahead of most dentists in business methods.

The proper grouping of operations requires that treatments be commenced at the first sitting, that extractions occur at the end of a sitting, that operations in adjacent teeth be done together, or at several days' interval, that tedious operations be not done at the first sitting, that the final finishing of several similar fillings be done at one sitting, that operations be not carried to the point of undue fatigue or pain, etc.

Credit and Collections. A man who can attract more work than he can do may well accept as patients only those of known good credit. Otherwise he may deem it wiser to do the largest possible gross business and collect it well. To have no system either in credits or collections results in a large loss.

Investment. Saving a little each year, investing in safe properties at reasonable interest, when young, protecting the family with insurance, avoiding extravagant living and get rich quick schemes makes for comfort.

Charities. If the dentist is forehanded in the above matters he can afford to give time to free big brother work for children recommended by some organization or school or other officials, and to educational work in public lectures. This is better than involuntary charity to deadbeats, which absorbs the strength of many dentists careless in business methods.

We have here offered food for thought for the average dentist serving average people. Is it not worthy of consideration?

C. EDSON ABBOTT.

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### TO WHAT EXTENT SHOULD THE GENERAL PRACTITIONER DEAL WITH CASES OF DENTAL MALPOSITION?\*

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BY S. H. GUILFORD, D. D. S., PHILADELPHIA, PA.

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In the natural growth of every branch of human activity, whether in the line of applied mechanics, science, art or commerce, there comes a period in its history when, through development, it has grown to such proportions or become so extended as to demand a division of its activities in order that its possibilities may best be realized.

Such divisions are known as specialties, and they develop as naturally as the organs of the animal body or the buds of the plant or tree. They are indeed but evidences of the force in the world which compels enlargement and tends to betterment in every direction.

While such specialization is interesting to note in any field of human endeavor, it is perhaps more interesting because more valuable when considered in connection with such branches of science as relate to the extension of life, the relief of human suffering or the general physical well-being of mankind.

The gradual evolution of the practice of medicine from nostrums and superstition to its present high state of scientific efficiency constitutes one of the most interesting chapters in the history of the development of the human race. And while its progress in earlier times was along the pathway of blind experiment, its more rapid growth in recent years has been entirely due to the carrying forward of its work along lines of true scientific research.

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\*Read before The New York Institute of Stomatology, March 1, 1910.

Dentistry, as one of the outgrowths of medicine, has had an experience very similar to it, but in a modified degree, because its field is more restricted.

Scarcely more than a half century ago the range of dental practice was so limited that every practitioner was expected and felt qualified to render any service that might be needed in connection with the dental organs. Indeed, the teeth themselves were the only part of the oral cavity upon which the dentist was supposed to exercise his skill, the associate parts being considered within the strict province of the medical practitioner or surgeon.

To-day all this is changed. The entire oral cavity is now the field claimed by the dental practitioner. This enlargement of the sphere of supervision, involving the histology and pathology of tissues closely related to the dental organs, or at least profoundly influencing their welfare, brought into being the first specialty of dentistry, Oral Surgery.

Later, after the experiments of Lister, Pasteur and Koch had established the true origin of pathological disturbances and indicated the scientific means of dealing with them, the way was opened for successful battling with the one disease that had proven most destructive to the dental organs, Pyorrhea Alveolaris; and its treatment began to engage the exclusive attention of certain practitioners, thus becoming a specialized form of practice.

In like manner the abnormalities of dental arrangement which had never enlisted very earnest consideration because not fraught with serious results, in course of time gradually assumed an importance that led many to devote their entire energies to seeking out the causes and devising means both for their correction and prevention, and thus the specialty of Orthodontia was inaugurated.

All of these outgrowths of the parent stem came about through a broadening of the original field of practice and the necessity arising therefrom.

Only through such specialization in any department of the healing or restorative art could real and rapid advancement be made, for the concentration of thought and effort upon a definite and limited part is necessary in order to fully develop and per-



fect it and through it add to the value of the original branch of which it forms a part.

The rapid growth and development of Orthodontia in the comparatively few years in which it had been recognized as an important branch of dental practice is little less than marvelous and is due in large part to the devoted work of the relatively few who have been impressed with its importance and who have possessed the natural qualifications for the solving of its problems and the overcoming of its apparent difficulties.

While the treatment for correction of irregularity of the teeth is almost entirely mechanical in character, those who early attempted its practice and who achieved a measure of success brought into play only some of the simpler and fundamental laws of mechanics and did not appreciate the variety of ways in which dynamics might be made to serve their full purpose in the movement of teeth. A closer study of the subject brought with it this revelation and led to the devising of numberless appliances, which, though often simple in character, were wonderfully effective in operation. In addition to the mere movement of teeth, attention was also directed to their proper retention in order that the results secured might be preserved.

But more important still was the gradual realization of the fact that the mere alignment of misplaced teeth, which earlier had been the sole object sought, did not, in many cases, restore facial harmony. Consideration was therefore given to this phase of the subject, with the result that in time methods were devised by which such anatomical changes in the lower half of the face could be made as to completely alter the expression and bring about facial harmony where before only inharmony prevailed. This has been and probably will continue to be the crowning glory of orthodontic practice, for certainly to remould the features without pain and by a form of bloodless surgery is an achievement which the most skilled surgeon would be pleased to place to his own credit.

In view of the developments just recorded, it must be apparent that the full possibilities of orthodontic science can only be realized by those who give to its study and practice the best efforts of their brains and hands; in other words, by those who make of this work a specialty.

If, then, specialists are necessary in this branch of science, as in most others, we should consider the question as to whether all cases of dental irregularity should be referred to those who confine themselves to this line of practice or whether the simpler cases presenting should be treated by the general practitioner.

In many of the affairs of practice we are wont to be guided by the rule followed by the practitioners of medicine, and this is natural because of the many points of similarity between the two callings. The general physician, when he meets with a case of defective vision, refers it to the ophthalmologist; or if it be an affection of the organs of hearing or of the heart, lungs or other deeply hidden part, it is referred to specialists in these departments; all of which is wise and proper, for, while the general practitioner of medicine possesses a good general knowledge of the various organs, their functions and the diseases to which they are liable, the field of medicine is too vast to enable him to acquire such an intimate knowledge of the pathology of all the parts as to make him skilful in the treatment of each. Therefore wisely recognizing his limitations, he is only too willing to have the specialist relieve him of the responsibility of treating ailments with which he is not thoroughly familiar.

With the dental practitioner, however, the conditions are somewhat different. His field embraces but one part, and that a small one, of the human economy.

It is also an open one, for the organs with which he deals are not hidden, but are fully exposed to view. Because of this limited field, he acquires an intimate knowledge of the anatomy and functions of the organs in his charge and the derangements to which they are liable and he can visually detect the very beginning of any aberration which the physician, in his field, cannot well do. In all of these respects the natural advantages lie with the dental practitioner.

But the general practitioner of medicine does not refer all cases of organic defect to the specialist, for if he did his field of practice would be decidedly limited. He commonly treats, and very successfully, too, minor disturbances of the more important and deep-seated organs, while affected parts that are within his range of vision, as the nose and throat or skin, he can and does administer to when the ailments are simple in character and without complications.

The first evidences of dental malposition in the child are usually detected by the dental practitioner in the course of his regular professional services to the family. Noticing these, it becomes his duty to call the parents' attention to the condition and advise them in regard to the necessity for immediate corrective treatment.

If he feels competent to remedy the condition both parents and child will prefer to have him undertake it rather than place the patient in the hands of a specialist who is new to them.

If he doubts his ability to treat the case successfully he should at least be able to diagnose the condition, give the parents a fair idea of what general course of treatment is called for and refer the case to a competent orthodontist.

In these days of professional enlightenment, with text-books at hand setting forth the principles and practice of any special branch of dental practice and with periodicals containing well-illustrated articles by men prominent in their special lines there is no good reason why the general practitioner should not possess sufficient knowledge to treat the simpler forms of dental derangement or at least to be able to advise intelligently in regard to their treatment. Very frequently the malposition may be only threatening through slight torsion of an erupting tooth or the crowding of a new tooth out of line by the delayed shedding of its deciduous predecessor. Such cases are constantly coming under the eye of every practitioner and can be cared for by him without the exercise of any more knowledge or skill than is required in other departments of his work.

But even in cases somewhat more advanced, where actual malposition has occurred the general practitioner will readily detect the extent of it and can hardly help but know of some safe method by which the alignment of the malposed teeth may be accomplished.

In more complex cases, however, where several complicating features are present and where a number of different movements are to be produced, or where, in his opinion, more than one method of procedure might be adopted and his experience has not been sufficient to enable him to select with certainty the one promising the best result the general practitioner would be unwise not to transfer the case to one whose knowledge and experience are greater than his own.

So that, after all, the question before us resolves itself into another question of drawing the line as to where the general practitioner should withhold his services and the specialist begin his, and this line of demarcation is difficult to establish.

As men vary in their knowledge and in their skill each should be able to decide for himself what he can and what he cannot do in the line of professional work. No one should attempt to treat even the simplest case of malposition unless he feels sure of his knowledge of the anatomy of all the organs and tissues involved and the means of applying such well-regulated and properly controlled force as will produce the desired movements with the best results.

If, however, he possess this knowledge and if through experience he has gained the confidence which is an essential feature of success, and if, in addition the character of the work appeals to him, there seems to be no good reason why he should not engage in it to the extent of his capacity.

Notwithstanding the errors that have at times been committed by practitioners essaying to perform orthodontic operations for which they were not qualified the fact remains that in past years numberless cases of irregularity have been carried through successfully and creditably by those in general practice. In those days there were no specialists in orthodontia and it fell to the lot of the general practitioner to treat all such cases as came to him. His knowledge upon the subject was extremely limited and he had little to guide him outside of his own experience.

If then, he were able to produce fair results under such disadvantages why should he not be able to render more skilful service to-day, when, through the investigations of those more especially interested our knowledge of the causes and treatment of dental irregularity has been so greatly extended.

The very nature of our daily work tends to develop to a high degree the mechanical talent that is born in us so that the technical part of orthodontic treatment should not be beyond the ability of any well-qualified dental practitioner, for it has been shown, times without number, that a dentist may be an orthodontist without being a specialist.



For those who feel that they are not qualified to treat even simple forms of dental irregularity or who have no liking for the work or those who fear that an unsuccessful outcome would injure their reputation, by all means let them refer every case of dental malposition to the specialist.

For those general practitioners, however, who read and study and keep themselves informed as to what is being accomplished in the various departments of dental practice, who possess mechanical skill and ingenuity and who delight in meeting problems for the satisfaction of solving them I would advise that they give their little patients, to the extent of their ability, the same careful attention and treatment in regard to malposition of their teeth that they do in any other line of dental service.

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### MUMMIFICATION OF THE PULP.\*

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By AMOS C. RICH, D. D. S.,  
Saratoga Springs, N. Y.

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Mr. President, Members and Guests of the Society:—I am willing to confess to a degree of pleasure in being with you to-night that is not often mine—I feel that I am in the house of friends and therefore shall welcome such criticism as you shall give upon the subject of my paper, which is “Mummification of the Pulp.”

This is a subject not threadbare nor is it young, but the profession lacks interest. They seem to prefer practising theories they call scientific rather than accept what has been proved. A method which is based upon facts almost as old as the world does not appeal to the theoretical sense of propriety.

A method so simple is too *easy*. A method so perfect in its results is truly scientific.

Gentlemen, let me appeal to you in all seriousness. In my enthusiasm born of years of experience, let me ask you to give this matter your best attention,—the subject is worthy of it.

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\*Read before The New York Institute of Stomatology, April 5, 1910.

My home being a summer resort, I am thrown in contact with results of professional work from all over the world, and it gives me great opportunity for comparison and judgment.

I want, if I can, to impress you with my exceeding earnestness in the truth of what I shall say to you. I may not be able to prove to you what I believe is the truth,—but I would I were able to make you all see this from the standpoint of my experience, which by virtue of its years ought to be convincing.

Let me state a few characteristics of the method:

Clinical simplicity.

Applicability.

No discoloration.

No disturbance of apical foramen.

Ease for both patient and operator.

Humanitarian.

Permanency.

Let us take them up in their order. First, certainly the method is simplicity itself. Merely placing the paste in contact with a dead pulp in such a manner as to reach the contents of the root nearly to its end and sealing it in place but never forcing it in cases of recently destroyed pulp. Second, it is certainly applicable to all the teeth, front, back, upper, lower, and especially to children's teeth.

Third. It has no color ingredients.

Fourth. It is not necessary to disturb the apical foramen to produce results, and the key of success is non-disturbance of it.

Fifth. It certainly is an easy method which does away with much time, nervous strain, and energy used in trying to mechanically cleanse and fill root canals.

Sixth. This of itself makes it humane, but the method does not include pain.

Seventh. Permanency you will have to prove for yourself before you will believe. I have proven it.

The *Cosmos*, November, 1895, p. 922, gives credit to Dr. Theodore Soderberg, of Sidney, Australia, for the formula of the paste I am using.

R

One drachm each of Dried Alum, Thymol and Glycerine, with zinc oxide enough to make a stiff paste.

NOTE—This paste becomes hard with age. Use Glycerole of Thymol to make it soft again, working it up on your mixing slab

What is mummification? The process or act of making a mummy.

What is a mummy? A *dead* body preserved from the process of putrefaction.

Let me call your attention to the fact that it is a dead body that has been mummified.

Do not confuse pulp capping with mummification, their purpose is not the same.

The component parts of any mummifying paste should be such as to insure a permanent aseptic condition, when so sealed in position as to preclude moisture.

Let us see what the ingredients of the "Soderberg" formula predicate.

Thymol prevents putrefaction and is very penetrating.

Alum—astrigent and coagulent, hardens and concentrates pulp tissue.

Zinc oxide—the absorbent of moisture.

Glycerine—the inert vehicle.

What other ingredients do you need to produce the desired condition, where you have previously relieved the tooth and surrounding parts from all abnormal conditions, which is the desideratum in the successful mummification of any and all tissue left in the tooth.

Why waste time in chemically dissolving the contents of tubuli and pulp chamber in order that you may ultimately inflict mechanical filling in those root canals.

Comrade practitioners, there is no getting away from facts and figures (the truth will in time assert itself). Many years of professional experience should count for something, and especially by one who has recorded his work since he began practice. He has pre-eminently more right to speak authoritatively than one who keeps an indifferent or no record at all. You cannot *doubt*

the records,—they are facts. You may impugn his professional honesty when he claims success for a certain method of practice; but when a professional brother has proven a method and has thrown aside all other methods for it, and THAT method means the success or failure of his practice, and he has succeeded, then you cannot doubt his honesty.

It cannot be you are lacking the genius of apprehension of facts. Rather let us live in the present not to mourn over blunders of the past—as the page is turned. There is no remedy for what is done except the wisdom experience may give.

My first use of mummification paste was December 9, 1899, and since that have up to January 1, 1910, treated 686 cases. I am not going to report specifically upon these cases. Results are uniformly successful. In April, 1908, I reported to my district society upon the cases I had treated prior to June, 1902, which were in number 87. I had a personal interview or personal report from all but nineteen of these cases. Six of them were dead and the balance were in foreign parts, and with no address. Of those reported seven had been extracted for some reason, leaving sixty-one doing good service at that time.

My method of use may be very well illustrated by reporting a recent case in practice. A young girl about thirteen years of age presented herself with a decayed first molar right lower. Cavity disto-approximal extending over much of the occlusal surface. No pain or inflammatory condition. Appearance indicated pulp dead, but found upon opening into the chamber of the bulbous portion of tooth that pulp in posterior root was dead and disintegrated and the pulp of anterior root was apparently alive and bled considerably when the bur struck it. What would you do with it? What did I do with it? Opened up and cleaned the canal of posterior root of loose debris, then pumped mummifying paste into it. Then placed a layer of paste in a creamy consistency over the pulp of the anterior root and over all flowed a cream mix of cement. Why a cream mix of paste and cement? To avoid consequent pain from pressure.

You will probably ask, Don't you expect trouble? and I answer decidedly *No*; but I had many misgivings and also some painful cases in my first use of it. I consider no other method equal to it and use no other in my practice except in front teeth



where I wish to crown the root. There I use orangewood points and pyroligeous acid.

Your only anxiety in the use of mummifying paste need be that the condition of the tooth may be as nearly normal as possible—any abnormal conditions other than decay should be treated and cleared up primarily. Any professional brother who thinks care and skill are not essential to success in this method as in others is mistaken. Our foremost professional duty is to save teeth. That being so, is not the man who saves them by humanitarian methods entitled to more credit and praise than he who does not?

Why do we look up to a professional brother? Why do we seek to honor him? Because he is successful in doing one or more professional duties better than his confreres.

If that is so, why do some professional brethren meet their brother who practices mummification of pulps with that genial unbelieving smile and raised eyebrows, expressive of uncertain credulity, varying only as the veracity and professional probity of those who meet varies.

Just the moment any man considers he knows enough, that man's future success is doomed.

It is the small man who is afraid to take an idea from another worker.

The X-ray has so thoroughly exposed to our eyes the ridiculousness of the theoretical methods of filling root canals that it is a foolishness to continue it. But still there remain those who foster and feed themselves with old ideals. Few operators have the temerity to claim to-day that they can fill all root canals to the apex.

Then why not so fill those root canals with such material that future trouble will be eliminated. Why destroy and try to remove from the apical ends of the roots what nature formed in those canals and which you can mummify and make use of as a root filling? That is a scientific course to pursue.

A scientific method is one backed by knowledge and used with an understanding of the facts.

A theoretical method is one created by speculation without a review of the facts. It is balked when it comes to the tortuous root canal that cannot be made to conform to the theory.

The one desideratum of all root fillings is to eliminate future infection.

If as much effort were made now to perfect a scientific method of root filling as has been made in the past to perfect a theoretical one we should soon have the perfect formula and the knowledge to use it.

The uniformity of good results obtained by those who habitually use a mummifying paste is quite remarkable and should command greater attention from the profession than it does. More's the pity for the poor patient—why should anyone, yourself included, be compelled to submit to long and painful processes because of a theoretical whim, when other methods are equally good, if not much the better?

Let me quote from a paper read before this body by Dr. J. A. Waas, of Hammonton, N. J., whose percentage of failures he figures at about one-half of one per cent.

"Please bear in mind that I am not a crank on this subject and do not wish to be understood as advocating the mummification of *all* devitalized pulps—and in my practice I apply this treatment *only to those pulps* whose removal in their entirety and the complete subsequent filling of the canals is doubtful. When, however, there is a *doubt* that the removal of the pulp and the proper subsequent filling of the canal can be effected, the *mummification treatment, when properly and thoroughly executed, is undoubtedly the best.*"

Right here is where the milk of the cocoanut is visible. That *doubt* is ever present, and when such a man as Dr. Waas, whose practice has been long with this method, acknowledges that mummification is undoubtedly the best treatment under such circumstances, it means something. It means that he has been forced to recognize facts, and that his failures have been less with such a method than with the old and tried theoretical one.

In a paper entitled "Indiscriminate Destruction of Tooth Pulps," by W. A. L. Knowles, M. D., D. D. S., published in the Pacific Dental Gazette, he says:

"Pulp mummification, quite *recently* and enthusiastically introduced to the profession, is an *unreliable* and *dangerous process*, while its use is *legitimate* in a few cases of necessitous devitalization where there is great difficulty in tracing out root canals. Its

use by the average practitioner is not confined to such cases alone."

"It is a lazy operator's method, practiced in order to avoid tedious and disagreeable after treatment. It is absolutely impossible to thoroughly and completely sterilize that portion of the dentine lying in the territory between pulp chamber or nerve canal in the interior, and the enamel and cementum on the exterior. The canaliculi being infinitesimal, cannot be deprived of their organic contents, nor can such portions be rendered aseptic, hence they always remain, to some extent at least, a source of danger," and this paper winds up with the following text:

"In the treatment of a patient, ever remember that he is entitled to your best knowledge and 'that thou art thy brother's keeper.'" I think I prefer as a motto the title of Charles Read's book, "Put yourself in his place."

Pardon me for all this quotation, but this author having made use of some of the standard arguments against mummification, I use it as a means of showing their fallacy.

He calls it unreliable and dangerous, and then in almost the same breath says it is *legitimate*, so I am forced to the conclusion that his definition of legitimate is that mummification can be used where no other method will suffice.

A method of that character appeals to me and ought to every other practitioner who is his brother's keeper. His remark that it is an impossibility to completely sterilize the contents of the canaliculi may be so by any other method except mummification, (I am speaking here of such roots as are not filled with pulp substance and the mummifying paste is used as a root filling). This method does not depend upon intermittent treatment. It produces sterility of the canaliculi and root canals perforce of its composition and its continued immediate contact. And here is a quotation of some remarks by Dr. H. D. Hatch in a discussion of a paper by Dr. H. E. Webster, of Toronto, Canada, on "Treatment of Root Canals."

"That as chairman of Committee on Practice of New York State Society I corresponded with men all over the country on questions of interest to the profession. At that time pulp mummification was being spoken of rather largely and that was

one of the questions I asked, hoping to bring out whether or not the method was being used successfully by the profession.

"The majority of the men who answered those questions at that time were of the opinion that pulp mummification was a delusion and a snare. At that time I was rather taken with it myself, and was using it in a few selected cases in third molars, and also in cases of poor patients who did not feel that they could spare the time, and would otherwise have had the teeth extracted. I used Miller's & Soderberg's preparations quite largely. Those cases progressed two or three years, some of them, and I think I have seen about the last of them, at least I hope I have. They have all come home to roost, and as I remember it there was only one out of those cases that stayed aseptic." (Dr. Hatch, in a foot note to the report of this discussion, probably sent to him for revision, says): "Upon looking up my records I find that my disgust at the failures presented has warped my judgment, and that by no means were they all failures. Just what the proportion is I cannot say until all the records have been gone over."

Here we have the unusual—a man who keeps records speaking from his memory and condemning what at least his records somewhat sustained. Dr. Hatch also had the temerity to select his cases, and I doubt if he selected the best, and for those *poor* people who did not have the *time* to spare—and he was disgusted with the results. No wonder he got some, and he deserved them. This is typical of many well meaning men of our profession; but if the right spirit actuated, and the same skill was exerted, and good judgment used in this, as in other operations they were called upon to perform, I have no doubt the results will be all they desire.

Further along in Dr. Hatch's remarks I find that he, in common with others, admits that he cannot remove all the pulp from the roots of all teeth, yet by sacrificing large portions of tooth substance he can remove some otherwise not removable, and that the patient's condition is bettered by so doing. *He* thinks the *patient's* condition was bettered, but the poor tooth had to suffer. He must mutilate and weaken to ease his conscience. Had he used mummification treatment properly he need not abnormally weaken the tooth structure and attain the same end, viz., saving the tooth.



In a paper by Nelson T. Shields, D. D. S., of New York, read at New York State Dental Society meeting, May, 1907, on "Treatment and Filling of Root Canals," he advocates filling the apical ends of roots with gold and the canal with oxychloride of zinc. I am not taking issue with Dr. Shields on his methods, but I am sure he cannot do it in all roots, neither can he do it in all teeth. What will he do with the incomplete ends of recently erupted molars with their irregular and very large apical foramina? He *suggests* a lead *plug* or else using a strip of foil. Can he do it? Can you do it with a perfect clinical result?

I feel that I can do it with greater safety by mummifying nature's own handiwork that fills the root perfectly.

Another quotation I would like to place before you for your consideration, and it is part of an editorial in the *Cosmos* for May, 1899, page 508, by Dr. E. C. Kirk, editor:

"It is far less difficult to seal a pellet of mummifying paste into a cavity, complete the operation in a short single sitting, and collect a fee upon the completion, than it is to do a thorough canal operation, and the very ease which this short cut through an essentially difficult operation, to the fee for it confers, is a dangerous temptation to degrade the high standard of dental work which should always be maintained."

And hereby let me appeal to you fellow practitioners to put forth your energies to make this method just as subservient as a means to an end in your hands as that of any other successful method practiced to-day. It depends upon us whether it shall be the means of degrading our high standard or of increasing our efficiency as savers of the people's teeth. My claim is that the best practitioners to-day can with no more certainty fill all the roots of all teeth than can the average practitioner, and therefore the necessity of a mummifying method, or its true equivalent.

It is not my purpose to review the different methods of mummification of the pulp, because it is useless—the ultimate object sought in each of the different methods is the same. The conversion of the pulp into an unalterable or sterile mass by chemical means and so sealing it that infection cannot come from the outside. Much of the non-success of this method doubtless comes from the failure to place the tooth and its surrounding tissues in a normal condition, prior to placing the mummifying

paste in situ. I have had cases of resultant pericementitis from a wrong diagnosis of conditions at the time of filling, but they always readily yield to primary treatment. I have found mummification especially applicable in cases of Phorrhea, where pulp destruction is used as a means to an end in the treatment, and I can recommend it where the disease has progressed to such a degree that the teeth are loose and much inflamed. The results of pulp destruction and subsequent mummification have been decidedly beneficial in my hands.

I have no doubt in my mind that auto-infection by micro-organisms transmitted to the apical ends of roots has produced inflammatory and painful conditions in those teeth, the pulps of which have been long mummified, but these cases assert themselves only when the patient is ill, and in a badly run down condition, and has not the vital energy to throw off the poison; but such cases yield just in proportion as such person's physical condition is bettered and we have in the same mouth the same condition in the normal live tooth.

I cannot resist calling your attention to a short paper by Walter H. Neall, D. D. S., Philadelphia, Pa., *International Dental Journal* for April, 1893, p. 251. The doctor reports twenty-one cases, with *success in all*, which were performed in a little over a year, and he finishes his paper with the remark that the results are not convincing and he is awaiting the day of reckoning. WONDERFUL.

While the cases cited are certainly bad ones as a rule, I venture the prophecy that they will be nearly, if not all, successful, and I base this judgment on success in my own practice.

Dr. W. E. Christensen, D. D. S., of Philadelphia, in "Some Comments Upon the Herbst Method of Treating Pulps," in *Cosmos*, May, 1893, says he has succeeded with the Witzel method in all cases except those of six year molars of very young and chlorotic girls (I don't know why the boys are excluded). In these he imposes the cause for failure to the size of and the protoplasmic quality of the pulps, and recommends their removal from the roots and filling with a strong antiseptic paste. *Query*, If this method is good in such cases, *why not in all?*

The *review* of the paper by Dr. J. A. Waas in *Items of Interest*, September, 1904, is certainly peculiar. The mummification

method is here openly abused. Here we have an illustration of the trend of the theoretical mind of the old school practitioner.

He *questions* the value of the *method*, while at the same time he refers to the *records* of *non-failure* as *incredible*. He does not underestimate the clinical value of Dr. Waas's *fortunate* (a very unfortunate word to use) experience, yet he must issue a word of warning. In other words, it would seem he means—Because I cannot do this and succeed, others must be careful, or the profession will be outraged.

Dr. E. R. Warner, M. D., D. D. S., of Denver, Colo., in a paper in January *Cosmos*, 1901, on "Some Phases of Mummification," he says: "The operator denies the advantage to be gained by the *complete* removal of the pulp, and absolute filling of the apex, but the *mechanical* difficulties attending such effort are the *obstacles* we are desirous of overcoming.

No short road to possible success should, however, be given consideration if the future usefulness of the tooth is to be in question.

Where no outward attack can be made upon the soft material within the tooth, an impervious condition existing, no harm can come; but where there is a possibility of an inroad of caries from a vulnerable portion of the tooth into the pulp chamber, then the paste material, or any substance of such consistency may be subject to destruction."

The doctor's statement is not altogether true. No advantage is gained by the *mechanical* method over the *above* the *mummification* method, because the end sought may be obtained in either way; but from a humanitarian standpoint the latter method is best. I cannot conceive of a tooth filled in such a manner that it would not be vulnerable to caries which *might* reach the pulp chamber, but supposing that it does, cannot repair or refilling be accomplished just as well in one case as in the other—a live tooth can be so treated.

Dr. Theodore Soderberg, of Sydney, Australia, in a paper in *Cosmos*, July, 1900, says (after tests for *six years* and *over*): "It would at least be imprudent any longer to dispute the probability that, of the two methods, the chemical is comparatively the surest, safest and most humane."

I have made no attempt to place this matter before you in an ultra scientific manner, or in language which might confuse and confound. I seek rather to present the proposition in such a way that I may convince you by simplicity of my great earnestness, when I say I have proved to my satisfaction the worth of it by the success I have achieved with it.

What I have left unsaid you have the privilege of obtaining by question. I presume from conversation with many of the profession that you know all about this subject in a theoretical way, but in an observant way by which we obtain a basis for scientific knowledge of a subject, many of you know very little, and have cared less. You are too strongly wedded to your old worn-out theories, and in your egotism have throttled your genius for the acquisition of facts.

I will make no apologies, but let my earnestness acquit my weakness.

How long does the profession expect probation to last with this method? If cases stand the test for five or ten years, ought not this be enough to warrant its adoption?

Permit me to thank you for your consistent attention, and I sincerely hope some one thought may find lodgment where it may be of value to some of the profession.

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## THE NEW YORK INSTITUTE OF STOMATOLOGY.

At the regular meeting of the New York Institute of Stomatology was held Tuesday evening, March 1st, 1910, at the Academy of Medicine, No. 17 West 43rd street, New York City.

The President, Dr. J. Morgan Howe, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the previous meeting, which were approved.

The paper of the evening was read by Dr. S. H. Guilford, of Philadelphia, and was entitled: "To What Extent Shall the General Practitioner Deal with Cases of Mal-position?"

*Dr. S. H. Guilford*—I can truthfully say that it gives me a great deal of pleasure to appear before the Institute. It sometimes is very difficult to prepare a paper that will exactly suit the audience, but in that matter I was helped by the committee, who



gave me a clue. I have chosen this subject because I have been much interested in it, and because I do not recall that this phase of the subject has been written upon before—how far the general practitioner should deal with cases of orthodontia. If this paper serves no other purpose, I hope it will be of advantage in bringing out the views of those who have been kind enough to come here to discuss it, so that we may know how many of the profession feel about the matter.

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(For Dr. Guilford's paper see page 208.)

#### DISCUSSION OF DR. GUILFORD'S PAPER.

*The President*—This admirable paper is before you. The discussion will be taken up first by the gentlemen whose names are announced, and afterwards, we hope, by a number of others. The first on our list is Dr. George C. Ainsworth, of Boston, whom we have great pleasure in welcoming, and from whom we will be pleased to hear.

*Dr. Geo. C. Ainsworth*—Dr. Guilford has covered the ground so well and so logically that I see nothing with which to take issue.

Considering this subject in the abstract, we should say that "It depends upon the man behind the gun." Whether he may be a specialist in the general acceptance of the term, or a specialist, disguised as a general practitioner.

All orthodontists may be good general practitioners but all general practitioners are not good orthodontists, and it is obvious that the rule which might be laid down to apply in the city where orthodontists are plenty, could not apply with equal justice in the smaller communities where there are no specialists.

And this leads us to a consideration of the subject: "Who is the Specialist?"

Is he the man who confines himself exclusively to one subject, (perhaps always has) or may it not, at least equally well, apply to the man who, while distinguished as a general practitioner, is especially distinguished in this branch of our science?

Webster defines Specialty as "The special or peculiar mark or characteristic of a person or thing. That for which a person is *specially* distinguished; an object of special attention"—not exclusive attention.

And he quotes from Bulwer as follows: "Strive, while improving your one talent, to enrich your whole capital as a man. It is in this way that you escape from the wretched narrow-mindedness which is the characteristic of everyone who cultivates his *specialty* alone."

And again from Dickens, when he says: "Think of this, sir, —remote from the impulses of passion, and apart from the specialties—if I may use that strong remark of prejudice."

There is danger in specializing, that the rays of one's vision may contract or may not diverge sufficiently to take into a proper consideration the various influences which may form to make a concrete whole. Nature furnishes illustrations of many incongruities besides the teeth of the adult in the jaw and mouth of the child, which she perfectly harmonizes later and without our assistance.

Dr. Bogue's instance of the puppy with the dog's paw, I have used with telling effect, and the ramshackle, ungainly proportions of the very young lamb, (in marked contrast to the comely proportions of the very young pig) which, however, is most perfectly harmonized a few weeks later, is another instance.

So that it becomes a matter, sometimes of very fine and mature judgment, when to, and when not to assist nature.

Is it not true that highly successful specialists have, as a rule, developed after a somewhat extended general practice in their chosen fields, and does not such success depend upon a broad foundation gained only through an extended experience, not only in the fundamentals of the specific line of effort, but in many co-lateral lines of service, not forgetting the in-born God-given talent for the specific line of endeavor?

Returning more properly to the subject under consideration. The qualifications of the dentist to do the work embraces first a knowledge and appreciation of the principles of orthodontia, as exemplified in the beautiful curves and relations of all the teeth to one another when in perfectly normal occlusion so that he may place a correct valuation upon the retention of each and every tooth.

How often do we see cases where extraction has been resorted to in order to correct an irregularity that outrages our sense of right and justice. I have repeatedly seen cases where

principle molars or bicuspid, upper or lower, have been extracted for no other reason than that the mouth was "too full of teeth" and slightly crowded, utterly unmindful of the fact that the mouth and face were yet in the developmental stage while the teeth were full size. Not that I believe extraction should never be resorted to, for that is a very strong position, but cases of irregularity which may be benefited by extraction are very rare.

With a knowledge and appreciation of normal occlusion comes the ability to diagnose a case, and next a familiarity with accepted methods of practice so that one may be able to select and apply the one best adapted to accomplish each part of the work with the least amount of suffering and inconvenience to both the patient and operator.

He should possess much mechanical skill and inventive faculty, as well as an appreciation of art and facial harmony. Should be endowed, sometimes, with wonderful patience and adaptability, and in handling difficult or complicated cases, large experience, and with all a liking for the work.

A word in regard to appliances, the commercializing of which is not an unmixed blessing. While in many instances they are a convenience, they are never as well adapted as the one specially designed and made for the case in hand; besides they encourage many a man without experience or natural adaptability, to undertake orthodontia with a blind confidence that somehow the appliance is going to do the work and pull him through successfully.

Instead, results are often disappointing and vexatious to both patient and operator besides reflecting discredit upon all orthodontic service; so that while such appliances may answer for a variety of single cases, the assembling and adapting to the more difficult ones, require more time and are less satisfactory than those specially made for the case in hand.

And again, as a rule, the man not capable of designing and making the appliance, or directing its manufacture, is not well equipped to carry a difficult case through to a successful conclusion.

We need the original research man, the inventor, the experimenter, and equally, the practical man to harmonize and apply the radical ideas in the concrete.

All men who have gained a reputation in this line of work are frequently appealed to for advice as to how to proceed, where it is perfectly evident that only dismal failure will crown their efforts. They haven't the slightest knowledge of how to proceed, or an appreciation of normal occlusion, so important in the matter of retention.

Such men I would strongly advise to refer their patients in orthodontia to the specialist or someone who has more experience and adaptability, be he specialist or otherwise, as his conduct of the case can but bring discredit to him and dissatisfaction to the patient.

On the other hand, as Dr. Guilford has said, numberless cases of irregularity have been carried through successfully and creditably by the general practitioner, and I doubt not many cases will be in the future, for as I have said, the rule that may be applied in the city cannot be applied in the smaller communities, and the local practitioner bears a responsibility that makes it imperative for him to do all that he can for his patients, and, to that end, be well posted on methods and devices to better conditions.

If the case is complicated or doubts arise, it is his duty to take council of others of accredited skill and ability, and particularly where the question of extraction is in consideration as a wrong step here can never be corrected.

May the time be not far distant when we shall better understand and obey the laws which govern the production of more perfect physical conditions in the human race.

*Dr. S. G. Perry*—What Dr. Guilford has said, has been so well said, that it leaves me nothing to answer, and what Dr. Ainsworth has said also takes the wind out of my sails; so here I am, a pauper, before you.

I might have known what Dr. Guilford would say, because he is so level-headed, that we can pretty well tell beforehand where he will stand on any subject. He has always had the happy faculty of making clear statements. I think this paper is a very excellent example of the correct system or pattern of paper. It is short but covers the ground well. I think I am in accordance with him in the main. If I should make any criticism at all, I should incline a little more strongly in favor of the



specialist in complicated cases. I believe that in the future there are to be more specialists than now, and it is useless to keep our eyes closed to the tendency.

Dr. Guilford says it is hard to decide on the dividing line between the general practitioner and the specialist. It seems to me it would be helpful in attempting to decide that question, to consider ourselves as missionaries, with professional missionary work to do in the world. We would then find ourselves asking, "What can we do that will be of the greatest benefit to our patients?" which with the professional man should always be the first consideration. Perhaps the second question should be, "What can I do to clear myself from bias? What can I do in the way of training my mind so that I shall see things in a broad, comprehensive way, and place no undue reliance on any one side of any subject?"

I am perhaps old-fashioned in thinking there is danger in specialization, because I have observed many times not only in our own profession, but in medicine, and surgery, that men who specialize are a little inclined to be narrow-minded—that may not be the exact term, but it will perhaps express what is in my mind. That is to be avoided. I once heard a patient say she would rather have the judgment of an old-fashioned doctor, who was more of a nurse than a doctor, than she would the opinion of any modern specialist. There is some truth in that, although it would be dangerous to tie up to in serious cases.

We must be a little careful about the danger and the seduction of specialization. I think this more particularly and more markedly holds in our department of dentistry, than any other specialty of medicine. It happens that many of the specialists in orthodontia are of the younger men in the ranks, who have not had long experience in general practice. I do not mean that as condemnation of the young men, but there must be a certain lack of experience. The older men, though they may not be active or keen in all things, have a certain advantage that comes from long experience, and that will sometimes outweigh, in my judgment, the advantages that come from more recent teaching. One must stand by and see the human teeth develop from early life to adult life before obtaining a comprehensive view of their development and of the true condition of the positions of the teeth.

Almost the first year of my practice I advised the extraction of two second bicuspid in the mouth of a young lady, and I never see her that my inexperience does not come to my mind. In the freshness of my knowledge, I had those two bicuspid extracted, in order to have the first bicuspid and the eye teeth move back. I saw the patient only the other day and there is about the same condition as when the teeth were taken out forty years ago. I did that foolish thing because of a lack of experience and in the specialty of orthodontia, it seems to me there is more risk of work being done which is not altogether called for, than in any other specialty I know of.

It may be that I have not freed myself from this bias that I spoke of and am therefore unable to see the question as it is; but I cannot help taking the view that many patients are more secure in the hands of older practitioners who are conservative, and yet not asleep,—men who are abreast of the times and want to do what is best for the patient—than in the hands of the very young, inexperienced men who come directly from the colleges and undertake the work of correcting irregularities of the teeth without having had any real experience in general practice. I do not want any of the younger men to feel that I am making remarks that are pointed at them. I am only saying what is in my mind; and I have a conviction that it is what I ought to say.

What shall I say about the question of turning over the younger patients? If, as was clearly stated by Dr. Guilford, and was well reinforced by Dr. Ainsworth in effect—if the work in the mouth of the child is simple and can be done by the general practitioner with ease and pleasure, I think it is his duty to retain the patient. Besides the reasons for this which I have already mentioned the young patients and the family feel accustomed to him and at home with him. It is rather an unpleasant thing to ask the patient to be transferred to the hands of another person, and if that can be avoided, I think the patient should be retained.

There is, on the other hand, a great deal to be said in favor of transferring even moderate cases—I go a little further than Dr. Guilford or Dr. Ainsworth—because a man who is doing nothing else—other things being equal—will be really better equipped for doing that work than the general practitioner.

When it comes to difficult irregularities, I think it becomes the duty of the general practitioner to turn the patient over to the specialist. Sometimes there can be a compromise made, and in some of the lighter cases, where one would be glad to have a specialist take care of it, I think it should be the privilege of the practitioner to make suggestions to the younger man as to the aim that is hoped for. The two should feel a unity of interest, and I think the young man should be willing to ask for advice in reference to the general trend of the work, even though he should reserve to himself the liberty of outlining the work, and of doing it in his own way.

As to the importance of orthodontia in general, it is only a natural development, another example of the natural evolution in our profession. It is one of the latest and most important. In the early days we were busy with filling teeth, striving to save them. Now we can do more than that, because we have so mastered the art of saving teeth that we know pretty nearly what we can do, and now comes the time to put them in proper position.

It is a little aside from the subject, but we are coming to the time when we are going to take more pains in the matter of substituting artificial dentures. While many of us know that the construction of artificial substitutes has fallen somewhat into disuse—in our joy at being able to do what we can with the natural teeth,—one of these days there will be a revival, and, in my judgment, that will be the next speciality. I think the most important specialty is orthodontia though I am not sure but that the treatment of pyorrhea might be linked with it in importance. The treatment of irregularities will be practised more in the future than in the past, because a certain proportion of the teeth will be irregular and the public will become more and more critical, demanding that the teeth shall be more perfect in position than they are to-day.

We older practitioners know that many of the younger patients that passed through our hands have irregular teeth now, and we know that in the future that will not be permitted. The standard will be higher, and if I should criticize the paper a little—I could not criticize such a level-headed paper very much—it would be that it does not seem to look for quite as high a stand-

ard as the profession will move to in the future and that dentists will have to have, and will be glad to have, the co-operation of the orthodontist.

One word more—I had occasion to present, as some here may remember, an article on "Ethics," in which I tried to show that the time is not far distant when we will have more cordial relations among members of our profession, and that we will trust one another far more freely than we have in the past. Just in proportion as we become more trustful of one another, will we be more ready to turn our patients over—because we older men who have felt we could do these things in our own way, will yet find among the younger men those who are conservative and who can do their work wisely and gently. Then we will be happy,—the specialist will be happy, the patient will be happy, and we will make a happy family—the public at large being benefited. It is the public benefit at the last that is most important.

*Dr. F. C. Kemple*—I did not have an opportunity of reading Dr. Guilford's paper, but I had a great deal of pleasure in listening both to the paper and to the very conservative discussion which has followed it. I believe that I can safely say I agree with almost everything that has been said pertaining directly to the subject of the paper.

Just to what extent the general practitioner is justified in dealing with cases of dental mal-position depends entirely, as Dr. Ainsworth has said, "upon the man behind the gun." If a general practitioner has a knowledge of present day standards in orthodontia—has a knowledge of normal occlusion, and works to that ideal with present-day methods—I cannot see how any person can say nay to him, so far as his practising orthodontia is concerned, or any other specialty that he is qualified to practice.

It is for the general practitioner himself to say where he shall draw the line. I should like to hear a paper some time by a person who is conservative and qualified to prepare such a paper, on this subject: "To what extent is the orthodontist justified in dealing with cases of dental mal-position?" Dr. Perry has expressed his position concisely with his usual splendid conservatism. First, he favors turning patients over to the specialist, and then, in his conservatism, he fears the specialist may be



a little too enthusiastic and perhaps extreme in his treatment and I wish to endorse most heartily that position, because I have seen appliances in the mouths of little patients who, I truly believe, had absolutely no need of orthodontic treatment. The irregularities were nothing more than the apparent irregularities attendant upon normal eruption of the teeth, and would have disappeared entirely upon complete eruption.

I have seen a number of cases where, if there had been no treatment at all, if the teeth had been watched from year to year simply as a precaution—the eruption would probably have gone on to a complete normal denture without the necessity of any orthodontic interference. I saw a case only a few days ago and was asked what I would do with it. The father had been advised to have the irregularity corrected, but so far as I was able to observe, the mouth was beautifully developed, the only irregularity being one which I believe nature would have taken care of much better than the dentist or the orthodontist. It would be well if each practitioner in medicine or dentistry could place himself in the position of the father of the patient—what would you want done for the patient if he were your own child? I would feel safer to place my child in the hands of a conservative, experienced general practitioner in either medicine or dentistry—one who was sincerely honest in his convictions and fearless in saying, “I do not know,” than to place the child in the hands of an enthusiastic, inexperienced specialist.

Unless a person has had experience in watching the eruption of the child denture, he is not able to discern just when the critical period arrives. As Dr. Ainsworth said—to know just when to assist nature is one of the most important functions of the orthodontist.

I would take exception to one statement in Dr. Guilford's paper. He said that for many years orthodontia held a very unimportant place in general practice, “because the irregularities of the teeth were not fraught with serious results.” I can hardly understand how he could make a statement of that kind, in the light of our present day knowledge, and in the light of his ability to weigh consequences. I believe the reason that orthodontia held an unimportant place was simply this: Treating irregularities twenty-five years ago was a bugbear to every gen-

eral dentist, because he was groping in the dark. He did not know what he was trying to do, and he did not know whether he would ever succeed. I am speaking now of the more complicated cases of irregularity. Since the development of orthodontia, the great majority of cases can be treated with more or less certainty as to results, though there are cases of mal-occlusion that baffle the most expert orthodontist of to-day, and he has almost no conception of what can be attained.

In answering the question, "to what extent should the general practitioner deal with cases of dental mal-position," I should say he shall do so to the full extent of his liking for the work, providing his ability and knowledge of present day methods enable him to meet present day standards. He is the one to decide the question, and if he makes a mistake his patients will decide for him.

I feel also that the dentists should be severe critics of the orthodontists. A great deal of harm may be done by orthodontic methods through lack of hygienic care of the mouth during the treatment of irregularities. As a note of warning in regard to the care of teeth during regulating, I would say I have one little patient who was wearing a labial arch on the lower teeth, and within two weeks I saw on the labial surfaces of the incisors white lines under that arch. It was not decay, but a bleaching of the enamel, a herald of what might come. In a mouth of that kind, if it is neglected, awful results may be expected.

In speaking the other day with a gentleman in regard to different methods, I told him that I had recently been using many expansion arches which were unthreaded. Instead of using the nut and screw, I have been using a perfectly plain wire, and soldering a lug on the wire just in front of the tube. He said to me: "That necessitates removing the arch every time you want to change it; every time you want to extend the arch a little, you must remove it, and solder on a new lug." The necessity for this extra work is a blessing in disguise. It is better to remove the appliances and take care of the teeth in a hygienic way than to have the convenience of simply being able to turn a nut and produce tension on the part to be moved. I believe the dentist, in a way, should be as severe a critic of the orthodontist for his failure to see certain indications that are detrimental to the teeth

as the orthodontist is severe in his criticism of the general practitioner for his failure to regulate teeth as he should.

*Dr. Martin C. Tracy*—I have been very happy to listen to this paper of Dr. Guilford. I think it is one of the best I ever heard on orthodontia—the most conservative and concise. I believe a dentist is capable of practicing orthodontia only after he has become a thoroughly competent practitioner, and after having had some years of experience in general practice. It seems to me the general care of the patient, while under orthodontic treatment, is of very vital importance, and the family practitioner should be so closely in touch with the orthodontist, or the orthodontist should have such a wide range in his work in caring for the teeth, as to make it possible to watch the teeth while the work is going on. Dr. Kemple's discussion of the subject I consider was very able.

*Dr. Chas. O. Kimball*—The paper has been to me very interesting, and some of the discussion, too; but it seems to me that the position of the last speaker comes close to the ideal position, and that is this: In medicine, the young man expects to get a general training before he specializes. There are a few of the specialties of medicine which he may take up almost exclusively at first; but during his hospital work he takes both sides of the service—medical and surgical—and after it is over, he usually practices in a general way at first, for the broad knowledge of his profession, before he takes up any specialty.

It seems to me in our profession the same thing should hold, because the orthodontist has the care of a child's teeth only until the eruption is completed, and then his care ceases. If his work is done perfectly, he does not expect to follow that child during early or late adult life; whereas the general practitioner has in mind continually not only the development of the teeth, but their permanent health and the health of the tissues around them. He has the expectation of following that child through adult life to old age, if he lives so long. That is to me the ideal way of looking at it.

The man who is in the pressure of a general practice cannot give full attention to the elaborate and difficult cases of orthodontia, and there is, therefore, a reason for the development of this specialty. It has not only come to stay—but to stay because

it has a definite, rational place; but that place can be better secured if each practitioner intending to practice orthodontia not only fits himself by his college training, but also by a certain course of office training in the practice of general dentistry first; or if he does not do it at first, he should combine with his orthodontic work the work of the general practitioner, in order that his mind and his skill may not be confined to the mere position of the teeth. Their general health, the general health of the patient, and the problems that puzzle us, from day to day, should be fully in his mind, and then we shall have a better class of orthodontists, and the general practitioner will feel he can more safely put his patients in their care.

I plead for a closer harmony between the two. I desire that there be a closer correlation between the orthodontist and the general practitioner, that we should consult with them, and that they should consult with us; and by a close interchange of judgment and study in each case, get the best results.

*Dr. H. L. Wheeler*—I have nothing but approval for the paper, and the discussion which has followed. I have become so accustomed to accepting what Dr. Guilford says, from having sat on the benches before him for a number of years, that I naturally feel satisfied now, as of old, that he is a safe man to follow. As a general practitioner who indulges in some regulating, I would like to say a few words along the line of the relation of the general practitioner to the specialist. Personally, I would like to get rid of a good many of my orthodontia cases, and would be only too happy to turn them over to a specialist; but a young man who is still acquiring the confidences and loyalty of families for patients, often finds it rather hard if he attempts to carry on the simple cases, to say to the one patient "I will attend to your case," and to another patient—and they may be acquainted or related—"I cannot attend to you." Therefore one is often rather forced into taking cases that he would rather give to a specialist. Then there are other things that militate against the confidence that Dr. Perry spoke of. We are in a state of evolution, but I believe the specialist has come to stay, and he will be a help to the profession and to the community.

I thoroughly approve of it, but not when specialists are made—as some are—in six weeks—or when a man who has not been



successful in general dental practice turns to orthodontia in the hope of being successful. We find them sometimes giving way to the temptations that confront them—as for instance a case that came to my attention within a week, the child having only a displacement of one or two of the anterior teeth. Not only was this irregularity not harmful but it made the characteristic of the individual more marked and gave an expression that was agreeable rather than disagreeable. In spite of that a man who claims to be a specialist in orthodontia, had frightened the patient's mother badly, telling her that unless this was remedied, the injury to the child would be very great. I found that the molars and bicuspsids were in almost perfect occlusion, and yet the specialist had offered his services for fifteen hundred dollars to make this case perfect. Of course, all specialists do not act in that way, and probably a majority do not; but as long as such things happen the general practitioner is rather uncertain what to do.

Another case: A lady took two of her children—one to one specialist, and the other to another. It turns out the specialist who is attending to the daughter is filling the teeth as well as attending to the orthodontia. The mother apologized to the regular practitioner. Of course the temptation was there, but the specialist must be considerate of the rights of the general practitioner, the same as in medicine. In medicine, the patient is always the patient of the general practitioner who refers him, and it will necessarily come to be so in dentistry.

The most excellent discussion by Dr. Kemple to-night is an indication that we do have specialists who are qualified and look at things from an extremely rational standpoint. I want to go on record as believing in specialists, and believing that the question will come out all right. If the specialist wishes to be recognized, and to have the value placed upon his services that he places upon them himself, he will have to be exceedingly straight and fair with the general practitioner, and as time goes on, I believe he will.

*Dr. C. B. Nash*—Following the latter part of Dr. Wheeler's remarks, I think when decay appears upon the palatal labial, lingual and buccal sides of the molars and bicuspsids, as the result of the wearing of orthodontic appliances, it is the orthodontist, rather than the general practitioner, who should take the respon-

sibility of that condition. While it may be strictly ethical for the specialist to courteously refer the patient back to the general practitioner, I believe his supervision of the case should be complete, and that his field of operation should be ample to take care of those cases, so that there should be no evidence whatever of injury to the teeth as the result of his operations.

*Dr. E. A. Bogue*—A certain clergyman not very long ago described an after-dinner speech as being like a Mother Hubbard gown—it covered a great deal, yet touched only upon a few points. I have been reminded of that characterization by some of the remarks on the subject to-night—"To what extent shall the general practitioner deal with cases of mal-position?" It seems to me he should deal with them to the extent of his knowledge and ability.

Dr. Kemple expressed pretty nearly my own view and Dr. Kimball has put the matter more concisely in advocating a thorough understanding as between various specialists and the general practitioner. If it is proper to stray from the exact question a little, I will venture to speak of a case that recently came into my hands. A boy came in to me a month ago for orthodontic attention. The question was put: "Will you fill those teeth?" "No, if he has a regular dentist." "Yes, he has." "Well, go back to him."

The boy came back to-day, and I found thirteen cavities that still needed attention. He was sent back in the first place for the express purpose of having the cavities attended to before he came to me. I must see to it that all cavities are filled before orthodontia is begun, or, the destruction that will ensue will be laid at the door of the orthodontic apparatus.

It is known probably to most of the gentlemen present, that difficulties of nose and throat—not to go any further, although we might mention eyes and ears—are interdependent upon conditions which underlie irregularities of the teeth.

A patient was brought to me by a rhinologist with the question: "Can you spread that mouth?" "Yes." "Will you?" "Yes, I will for you. I will do no dentistry and no orthodontia, and this is done for you exclusively. The boy is the patient of another dentist, but I think that dentist does orthodontia. I will spread his upper maxillary and try to get a straight nasal septum." I knew what I was doing. I am conscious, however, that neither the orthodontist nor the dentist was aware of what I was up to.

That same thing occurred in two other cases, one of which I heard of yesterday. The rhinologist said it was the most splendid case he ever saw. Two weeks sufficed to spread the boy's mouth so as to bring his nasal septum almost straight. I know as well as I can know anything in the future, that that boy's permanent teeth will now come through with no more need of interference on the part of the dentist than Dr. Kemple's case. I have spread the upper arch, and now the temporary teeth may fall, the permanent ones come in, and there will be ample room for them to erupt.

Heretofore, and for some time in the future, dentistry of course will be reparative; but we may by taking thought and investigating, reach a point where prophylaxis will not only consist of prophylaxis against pyorrhea among the teeth which already are—but will reach forward to teeth that are to come, and prevent those things that tend to interfere with usefulness or durability.

*Dr. Kemple*—In regard to cavities that may be in the teeth when a patient is referred to the orthodontist, I believe it is perfectly possible for almost any busy dentist to overlook one of those very small obscure cavities which have their beginning at the point of approximal contact on a molar, impossible to detect unless the teeth are separated. I have had patients come to me for orthodontic treatment, and have found on separating the teeth such a small break in the enamel of one of the molars on which I wished to place a band. In such cases it is a perfectly simple matter to have the patient go back to his dentist without in any way arousing the suspicion of the patient and without letting him know there is a cavity anywhere. It is an easy matter to call the dentist on the telephone, and ask him in regard to it. There should be no difficulty about a question of that kind at all if the dentist and orthodontist are perfectly frank with each other.

*Dr. Bogue*—May I be allowed to second what Dr. Kemple just said most heartily? Lest he had this in his mind, I would say that the case which I mentioned was that of a patient who lives far away, and the boy must now stay in New York for some time. He was offered to me, and the fillings were offered to me, but I declined them.

A lady stood in front of her little daughter in my office, and said: "I have received word from a friend of mine in St. Louis, telling me on no account to let my daughter's teeth be regulated; for the regulation of teeth as generally practised has resulted in more harm to the teeth than benefit—for decay has followed for successive years."

Those were the times in which cement was not used under bands. There should be an absolute confidence between the specialist and the practitioner, and if the practitioner will take the trouble of studying the principles underlying orthodontia, he may prevent much of it by guiding erupting teeth into their correct positions.

*Dr. Wilbur M. Dailey*—I have heard the discussion to-night with great interest, and it seems strange that a mistake should be made—that is, constant repetition of the term "mal-position of the teeth." Inasmuch as this subject has been taken up very comprehensively by many men, it should be considered as relative to the bone by which the teeth are held, and the question of bone development. The position of the teeth should be of paramount importance to the general practitioner, and if he is competent to stimulate the bone development at the proper time, when the transitional period takes place at the time of the deciduous teeth, it will prove of benefit. We know the entire tooth has not developed until the child has almost reached the age of puberty. If the bone be stimulated the irregularities spoken of will not occur. With proper bone development, the tooth will develop normally.

It will therefore behoove every general practitioner to watch for the development spaces in the deciduous teeth, which spaces are to compensate for the difference in the deciduous teeth and the permanent teeth to take their place, and we can figure out approximately by experience, or by measurement, or by using the X-ray, where the permanent teeth are to erupt into their positions. There is nothing hap-hazard about it. It is scientific. The lack of bone development causes the mal-position of those teeth. I simply make that suggestion.

*Dr. Guilford*—In preparing a paper for a society, I have always had in my mind the dread of tiring my audience; and for that reason, I have made it the rule of my life to write rather short papers; but sometimes, in trying to avoid one evil, I fall



into another: not writing enough. I think I could have improved my paper by writing a little more elaborately, and Dr. Perry's criticism was just.

The specialist in orthodontia has been an evolution and a very important one. In spite of the fact that we have an increasing number of men who devote themselves to this work, we have not even one-tenth enough. Suppose the general practitioners were to turn over all their cases to these specialists? They would be swamped. We have not enough. I believe the general practitioner ought to pay more attention to the correction of irregularity—partly for the purpose of practising it in minor cases, and partly so that he can advise intelligently in the difficult cases. So much has been written, and explained, and developed along these lines, that anybody can get very full information on the subject; and yet many practitioners seem to dread it. If the general practitioner would simply take advantage of the opportunities he has of acquainting himself with the subject, it would be of immense advantage both to himself and his patients.

The work itself, even if one intends to indulge in it to but a limited extent is so beautiful and attractive. It has always been so to me, and I think to all those who understand it so, that I do not see why more do not pay attention to it. I emphasize this in speaking to my students. I tell them that even if they do not intend to be specialists I want them to know something about what constitutes normal occlusion and mal-occlusion, and something also about the treatment of these irregularities.

A hearty vote of thanks was given to Dr. Guilford, and to the gentlemen who discussed the paper.

Adjourned.

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#### THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, April 5, 1910, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The President, Dr. J. Morgan Howe, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

## REPORT OF COMMITTEE ON THE RECKLESS EXTRACTION OF TEETH.

*Dr. H. W. Gillette*—The committee, after considering the remarks that were made at the presentation of the proposed resolutions at the last meeting, took the matter under consideration again, and decided to recommend the following:

*To The New York Institute of Stomatology:*

Your committee appointed to consider the unwarranted extraction of teeth presents the following resolutions:

Whereas: In spite of the repeated demonstrations of the disastrous effects of the extraction of molar and bicuspid teeth for young persons, either for alleged advantages in Orthodontic work or because of decay, which could be checked with ease and permanency by the exercise of ordinary professional skill, some dentists continue the practice and send young patients to specialists in extraction to have such teeth removed; be it

*Resolved:* That this Society hereby records its emphatic disapproval of such procedure and its opinion that to extract sound teeth, or teeth which reasonable care and skill will make serviceable without unwarranted and extreme suffering on the part of the patient, is to be depreciated and strongly condemned, also that such extraction may only be permitted after consultation with and assent on the part of other reputable dentists who are experienced in remedying, in less radical ways, the conditions for which relief is sought.

Respectfully submitted, with the recommendation that the Allied Societies and all dental societies in the vicinity of New York be invited to pass duplicate or similar resolutions and publish them in dental journals as part of their proceedings, or in other ways, and the further recommendation that, when these resolutions shall have been long enough before the dental profession to have been well considered, measures be taken to bring to the notice of medical societies our position in this matter, and that consideration be then given to the question of the advisability of publishing them in the public prints.

J. R. WATSON,

A. L. SWIFT,

H. W. GILLET.

*Committee.*

After considerable discussion the resolutions, as amended, were adopted.

*Dr. H. L. Wheeler*—Since our last meeting, one of our active members, Dr. James G. Palmer, has passed away, and I would move that a committee be appointed to present suitable resolutions in regard to his demise.

Motion carried.

The President appointed Drs. S. H. McNaughton, George E. Adams and F. Milton Smith.

The paper of the evening was then read by Dr. Amos C. Rich, of Saratoga Springs, N. Y., on the subject of "Pulp Mummification."

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(For Dr. Rich's paper, see page 214.)

#### DISCUSSION ON DR. RICH'S PAPER.

*Dr. George A. Wilson*—In order to discuss this paper intelligently and with fairness to its author, it is essential to get a correct idea as to what extent Dr. Rich uses and trusts his method of pulp mummification.

This is not so easy to do from his rather brief statements as to how his operations are performed, but from the general tone and import of his arguments, I get the idea that he would trust it, in most cases, to do the work quite as well, if not better, than the old-time methods.

This question of how to treat the dead pulps of teeth, is an interesting one—ever-present, insistent and demanding, in its successful accomplishment, all our knowledge and skill. We are quite willing to use any and every method to reach and render null and void—for all time—that last bit of troublesome pulp tissue—at the apex of that impossible root, and to say that we do not believe in pulp mummification would not be true; neither, perhaps, would it be true to say that we believe in and practice it in the way the essayist so earnestly beseeches us to do.

Henry Ward Beecher once said in his pulpit that he was often asked the question: "Do you believe in Spiritualism?" "No." "Do you disbelieve it?" "No." "Then, what do you think of it?" Said he, "If I had all my wealth in lead and some one offered me silver for it, I should take it—and if I had it all in silver and gold was offered instead, I would accept the gold."

I know that there are many earnest, honest workers trying to solve this question of pulp mummification, sterilization and substitution—they are after the gold when best methods and results are the issue.

It is not my purpose in this brief discussion to enter into any hair-splitting arguments as to detail and technique of these operations; rather to define and bring to our aid some well established principles, is better.

As the essayist has quoted from one who has done much good work, both for us and the younger members of our profession, in starting them aright—Dr. E. C. Kirk—so, will I recall to your thought a part of that quotation; viz.: “the very ease which this short-cut affords through an essentially difficult operation, to the fee, is a dangerous temptation to degrade the high standard of dental work which should always be maintained.”

Just why the essayist should have introduced this statement of Dr. Kirk’s in substantiation of the superiority of pulp mummification, is not so apparent.

In this statement of Dr. Kirk’s there is certainly a well defined principle of action. We may look, I think, for another well-established truth in the fact that, whatever has been found by the great majority of earnest, honest, thoughtful workers, in any field, to be good is good, and we may safely accept the results they have wrought out for us.

All honor is due to the man who, in the last decade, has chosen wisely and well from the many fads and new inventions and used only those that were useful.

Level-headedness in the practice of dentistry in the last twenty-five years—real good common-sense discrimination—has saved many a patient from disastrous experimentation and the fortunate practitioner from much chagrin, disappointment and humiliation.

Where, then, shall we look for the standard of correct methods, as to pulp treatment?

“A mummy is a dead body preserved from the process of putrefaction.”

Why should a dead body ever be preserved in a tooth—or anywhere else—when it can be removed and thrown back into nature’s crucible to be made over into benign atoms of some kind?



It is a law of nature that something must die that something may live, and all things must, in the end, conform to this law.

The Egyptians may have been expert mummifiers of dead bodies—for sentimental reasons probably—but, that the Twentieth Century has any use for their art is doubtful.

The common-sense way then seems to be: remove all dead matter possible from the pulp chamber and roots of teeth; cleanse and render steril the whole root by frequent and persistent chemical means; insert a new tenant of some of the many materials we have for that purpose, and I believe we have a far better, safer and more scientific filling than any mummified pulp can ever possibly be.

In my own behalf and of the honest, earnest workers who have long sought the best of methods and results, I cannot let go unnoticed the essayist's closing words; viz.:

"I presume from communication with many of the profession, that you know all about this subject in a theoretical way, but in an observant way, by which we obtain a basis for scientific knowledge of a subject, many of you know very little and have cared less. You are too strongly wedded to your old, worn-out theories, and in your egotism have throttled your genius for the acquisition of facts."

To this is very considerably added:

"I will make no apologies; but let my earnestness acquit my weakness."

These words will challenge discussion, if nothing more, and it was evidently the intent of the writer that his paper should not pass without discussion—as do many others—simply for the reason that no exception could be taken.

Earnestness and enthusiasm are commendable qualities, but without real level-headed application they often over-shoot the mark.

So, I think I voice the sentiment of this Society, when I say that if we are too strongly wedded to our old worn-out theories, and our egotism has throttled our genius for the acquisition of facts, then we must thank Dr. Rich most sincerely and heartily for his earnest and enthusiastic effort to awaken us to new life and more intelligent effort.

*Dr. S. E. Davenport*—I find myself prejudiced in favor of the essayist, but against his contention.

In favor, because of his personality; because of my obligations to him for skillful service rendered to many of my patients; as are probably many others here, and because of his father—one of nature's noblemen. I often look with deep respect at the name C. F. Rich, upon a diploma which I value highly.

I very much doubt, by the way, whether that Elder Rich, with his determined stand for thoroughness, would have looked with favor upon the position the son takes upon this question.

I find myself prejudiced against our essayist's position because of the force of long training; of habit and of judgment which is based upon some knowledge of the fundamentals. However, in spite of my prejudice against what Dr. Rich has brought to us, I shall try to be fair in my criticism.

I have been unable to understand from Dr. Rich's paper just what his method is, for he really gives us very little detail in the sixteen typewritten pages. He does state that his treatment of one lower molar was to cleanse the posterior root of debris and pump paste into it—as a paste root-filling, I suppose—covering over, with the same paste, the anterior canal, which had living contents. I wish the doctor had been more specific so that we might know more about his methods. Whether he expects to control putrescent conditions with the paste or to use it only with pulps which have life, and what he would do with the many stages of condition intervening; also, just where he would draw the line. In other words—either his plan is a scientific one which is capable of being explained and varied according to the exact condition of the tooth, or it is a makeshift, a time-saver and a work-preventer, merely.

If the paste, in his opinion, is sufficient to control putrescent contents and prevent the formation of abscess, he should do us the favor of saying so.

Was not the plan described by Dr. Rich to explain his treatment of the living pulp in the anterior root of the lower molar, as good a description of pulp capping as ever Dr. Atkinson gave in the good old days—even to the layer of cement over the paste to prevent the irritation from pressure—and what greater assurance was there of the good behavior of that pulp than if it had

been "capped" instead of "mummified"? And yet, we are asked not to confuse pulp-capping with mummification! Dr. Rich reminds us of the very imperfect results following various methods of root-filling, as shown by the X-Ray pictures of such roots. He also has much to say about the foolishness of removing the contents nature placed in the ends of roots for the purpose of placing other material therein as a filling, when this process of mummification would make the original contents the best possible filling, unchanging, etc., etc., but he does not bring to us radiographs of roots with their contents mummified to show the perfect result in contrast.

Dr. Rich is so enthusiastic about this method that he already exhibits some of the narrowness of many specialists in other professions, for he informs us that he "has thrown aside all other methods for it" and that his reputation as a successful practitioner must stand or fall with it. I doubt whether any method of practice is so sure and of such value as to be applicable to all cases!

I must commend Dr. Rich for using a paste of known composition, instead of some one of the many secret nostrums so extensively advertised for the purpose.

We have all had brought to our attention many times, proof of the fact that teeth, the pulps of which have died from one cause or another, often remain quiet for years, the root contents not having been disturbed and I can well understand that a large majority of the six hundred and eighty-six cases of Dr. Rich has treated with this paste between December 9, 1899, and January 1, 1910, would naturally give no sign of disturbance, he having used the utmost care in all collateral steps.

Dr. Rich can, of course, speak with positive knowledge concerning the behavior of pulpless teeth in the mouths of patients who are seen regularly, but in any practice there are some who refrain from presenting themselves for frequent examination and the proportion of such patients would naturally be greater in a practice in a summer resort than in an ordinary practice.

I feel sure, therefore, that the most Dr. Rich can say about many of the six hundred and eighty-six cases he reports is that, so far as he knows, the teeth so treated have remained com-

fortable, for patients in distress do not always return to the dentist who first treated the tooth.

The witty comment made many years ago by Dr. W. B. Hurd, who was giving his views on the behavior of patients when in trouble, has a direct bearing here.

Dr. Hurd said, "the critters have legs and they use them."

The term "pulp mummification" is comprehensive and alluring: "the substance of things hoped for, the evidence of things not seen." It expresses a strong hope for a result which is striven for in a happy-go-lucky way against conditions most adverse. The paste used by our essayist is most excellent and very likely would "mummify" if it could be made to entirely surround the object of its affectionate regard and be kept from dilution by fluids from other sources. The advocates of this method all seem to rely largely upon the results achieved by the ancient Egyptians in the preservation of their dead, and when Dr. Waas appeared before this Society some years ago he brought with him and exhibited to us a mummy's hand.

I have never been able to see very much in common between the two conditions and when the mummy is lugged in—either in the flesh or in story—the evidence in support of this method of pulp treatment has always seemed to me to be weakened thereby. I need not mention in detail the various differences in condition surrounding the real mummy and the pulp, the mummification of which is desired; we all appreciate that the differences are radical and the resemblances few.

The pulp is enclosed in a structure no closer in texture than a sieve, just outside of which is a never failing reservoir of moisture. When, therefore, our essayist informs us that in the lower first molar of a girl thirteen years old he treats the living, bleeding pulp of the anterior root by flowing this paste over it, I say if he is capping that pulp and has been particular in his surgical methods he has my best wishes and may succeed, but if he is really expecting to mummify it, I sympathize with him and hope he will be ready when the trouble comes.

Had the Egyptians followed similar methods they would have prepared the late Rameses II for export to this country by placing their spices and pastes on the top of his head and standing him in a post-hole filled with water!



• While I do not pretend to be able to remove the contents of every root to its apex, I do believe that all of us can approach perfection in that respect with the many improvements which have been made in broaches in recent years. At any rate, I believe it to be advantageous and a factor in influencing the future good behavior of devitalized teeth, to remove as much of the dead pulp structure as possible. The statement that the less putrescent matter left in a root canal, the smaller the chance of rebellion, seems to me to be not only logical but worthy of being followed in our clinical work.

If this so-called mummifying paste is of value in keeping quiet a root filled with dead substance, it would have a still better chance of success when but a small quantity of material was present.

*Dr. J. B. Locherty*—When the question of root canal treatment and subsequent filling is presented for consideration, one feels at once deeply interested to know just how the essayist of the evening will discuss the subject.

From the vast experience which Dr. Rich has had in mummifying pulps and the uniform success attained, one may readily appreciate the true enthusiasm which he evinces when speaking on a subject so full of such interest to him, as it is indeed to all of us.

According to clinical records kept of teeth treated in this manner in some of the hospitals abroad—copies of which I have seen in our dental magazines—success was quite uniform with such cases as they were able to keep track of, and there is no doubt that in hospital work, where numbers of cases are presented for treatment, the mummifying method commends itself not only for its efficiency, but also its quickness and simplicity as well.

When one, however, further considers the many phases of root treatment that are continually presenting themselves for our consideration and services, we are at once struck with the forcible fact that the hidden or remote danger always attending such conditions, even though treated in our most scientific and approved manner, is always to be reckoned with.

The remote danger is present when the least particle of nerve filament is allowed to remain, even though it be placed in

an antiseptic condition, for decomposition is always liable to start in through some diseased condition entering the apical foramen and thus changing this supposed sterilized filament to septic matter. On the contrary, if it is possible to remove all of the pulp from the canals and replace with a foreign, aseptic substance, such a danger is reduced to a minimum.

It would, therefore, in my judgment, be infinitely better to remove by mechanical and medicinal means a devitalized pulp—to be replaced by a suitable root canal filling—than to depend upon certain mummifying agents, which might by some outside condition and action lose their mummifying power.

As Dr. Bromell in his work on "Practical Dentistry—By Practical Dentists" truly says, there are seventeen ways of destroying the pulp; thirty-six different ways of removing the pulp; over fifty ways of root canal treatment, and over seventy different methods of sealing and keeping sweet and clean, root canals.

Dr. Rich need not feel discouraged, therefore, if many of his professional brethren do not adopt at once the methods advocated by him—when he bears in mind the infinite variety of methods which are ever before us for our consideration, according to Dr. Bromell's interesting work.

*Dr. M. L. Rhein*—Knowing Dr. Rich as I have, for thirty years, I feel very much as Dr. Davenport did in his discussion, in regard to my feelings for Dr. Rich—that is, the earnestness and the spirit of helpfulness that he has endeavored to put in the beautiful production he has read to us tonight. The paper cannot be received without a desire to thank him, at any rate, for the spirit in which he offers it to us. Feeling as I do towards him, I wish it were in my power to jump into the arena and take his side in this discussion. I have, however, just a word or two that I would like to say. I sympathize very strongly with the underlying sentiment that runs through the essayist's production, and what is more, I agree with it as he expresses it. In other words, he brings to our notice the superiority of what he calls pulp mummifications over the old-time empirical treatment of root canals. As Dr. Rich understands the question, I thoroughly sympathize with him; but I differ with him radically on this point—that I believe he is not up to the present or the modern handling of root canals. To my mind, the method of root canal

treatment as it was practiced twenty-five or thirty years ago, and is largely practiced at the present day, is justly subject to all of the criticisms that Dr. Rich gives it, because it is not a scientific method—it is haphazard work; but I take the same exception to Dr. Rich's method that he takes to the old method. His work is not scientific work. I am surprised that in the prepared discussions this evening, sight has been lost of the fact that the late Professor Miller gave this treatment a very fair test, and abandoned it, because it was scientifically inadequate and an absolute failure.

Dr. Rich adequately said he was in the hearts of his friends this evening, and I am sure that he is; and I do not see how he can doubt the fact that very likely there is not a man but feels as I do—that we would like to agree with him. The unfortunate thing is that a careful hearing of his paper condemns him. I object to the calling of this method pulp mummification, because I do not consider any of those things do mummify the pulp, and Professor Miller's experimentation brought out this fact, as I recollect it. Dr. Rich tritely says, in one part of his paper, that under stress, when the patient's vitality is lowered, we may get re-infection at the apical end. He condemns himself in that sentence much more strongly than anything that has been said that I have listened to this evening.

Dr. Davenport very tritely said that the history of our work in this direction is filled with a large percentage of cases where no attempt has been made to properly treat the root canals, and yet they have not given trouble for years. This is the crucial point—we cannot judge of the success or failure of root canal treatment, because they remain quiescent. They do not even declare to us, because they are quiescent, that they are not a fruitful source of disintegration of vital force during that period; and the only thing that will prove that that is not the fact, is the radiographing of the so-called successful cases during this period. That has been done, gentlemen, and I am not in a position to give from memory, because my own memory is as bad as Dr. Hatch's was—as Dr. Rich quoted; but I know in a general way that the number of blind abscesses that we find with the radiograph—where no conception of their being there is entertained even by the operator or the patient—that are acci-

dentally discovered in radiographing for other purposes—is a remarkable fact that radiography has brought out. It has been discovered that a large percentage of teeth that we have classified as successes have small, blind abscesses at their ends, small enough not to give trouble to the patient; but we all know, if we know our pathology, that the reason they do not give trouble is that the area is so small that the absorption of this matter is the means by which it is eliminated; and we also know that there is no greater destroyer of life itself, than the continuation of such conditions in the mouths of our patients.

Knowing Dr. Rich as well as I do, I know the time is only short when he will change his views on this particular subject. There is nothing in dentistry that I have given closer application to, and I believe that we have no right to transgress in our treatment of pulp canals from the sound pathological and surgical principles that apply to every other part of the body. If this were sane treatment, then it would have some place in the treatment of similar conditions in other parts of the body; but as far as modern surgery is concerned, such a thing as this would be immediately tabooed, because as the essayist himself has said, through the circulation at the end of the root it is open to infection. There is no doubt that there is a percentage of roots that cannot be explored to the bottom; but I believe that the dental profession has exaggerated the amount of that percentage. I place that percentage, in my own estimation, at not more than two or three per cent. Suppose it were ten or fifteen per cent. It would then still leave the operation of the principle of removal of every portion of organic tissue, and the placing of the canals in an aseptic condition—and I use the word aseptic quite differently from what the essayist did. The essayist spoke of his method being aseptic, when he meant antiseptic—there is absolutely nothing aseptic in the method proposed by him; but, I say, remove the contents, and leave the canal in an aseptic condition, so there will be no irritation at the apical end, and prevent the infection from the palatal or crown end. Those are principles which can be followed, and they are in accordance with both our present knowledge of pathology and also the application of scientific chemistry to the therapeutics of such pathological conditions.



I want to say that it is a remarkable fact how many supposedly inaccessible abscesses of roots can be reached, if their anatomy is studied by means of the radiograph, and the angle sought which will make as nearly as possible a direct line from the entrance to the end of that canal. I have a large collection of radiographs demonstrating this fact thoroughly.

I want to say another thing. Modern dentistry enables us to restore every part of the crown of the tooth—I do not care whether the entire crown be taken away—we can do that beautifully; but none of us can restore the pathological conditions that take place around the pericemental attachments of the roots. Those are the things that are to be considered; and in teaching this subject, I invariably say, if it is necessary to reach the end of the root, I would remove every part, unhesitatingly, of the crown of the tooth rather than run the risk of having any bad results at the end of the root.

I have advocated this principle, which is a very broad one; but I believe it is the key-note of real success in a large percentage of cases. I think this feeling that has been imbued into us as dentists, of the sacred nature of the crown of the tooth—to conserve every part of it at any hazard—is one of our inherent weaknesses in doing the best we can for our patients; because we have means to give a mechanical substitute for that crown—a thing which we cannot do with the root.

*Dr. A. C. Rich*—I do not know that I have many closing remarks to make. I have been pleased with the discussion and I feel better than when I came. I do not think much of the paper, and, if, as Dr. Rhein has said, I condemned myself, I am honest about it. Those conditions do come, but they come in other teeth as well as in those that are mummified. The doctor shakes his head, but I have seen it.

*Dr. Rhein*—Perhaps, with the old-time methods.

*Dr. Rich*—Well, I am talking about old-time methods. Of course, the profession is advancing all the time, newer methods are coming and one of the aims of the paper is to wake up the profession, because we are not doing what we ought to do. I have asked that my method be tried. People who have discussed this this evening have said I have not told them what I do. Possibly I have not, but I have said this: restore the tooth to a nor-

mal condition before attempting to put any mummifying paste into it. The keynote is the non-disturbance of the apical foramen. Disturb that, and we will get trouble. As to whether there are blind abscesses, test them. I do not use mummifying paste until I test the tooth, and I put it into a condition which I call aseptic—although the doctor objects to my adjective. Perhaps I am wrong. However, I get the results, and that is what I am after. I save the teeth, and when Dr. Davenport takes exception to my being in a summer resort, and says that I possibly do not keep track of my patients—not many of the summer people who come to me get the mummification treatment. I would not permit myself to do for other dentists' patients something I know most of them do not approve of. I am not going to inflict my own whim upon other people's patients; but I do use it with my own patients, and I know what the results are. I could call them right in—thirty or forty or fifty at a time. I am going to take some radiographs, and see myself what there is. The doctor says I will find something. Possibly I am wrong, and I may be converted.

But the main point is, save a tooth, and by a perfectly scientific method—not the haphazard method that is generally used by the profession.

*Dr. B. C. Nash*—I think it would be helpful to us if Dr. Rich would define a little more fully the method he uses. For instance, a patient comes with an exposed pulp. What is his first treatment, and how does he follow it up. That, in contradistinction to what is known as a putrescent condition, where one opens the tooth in order to liberate gases—whether he uses this treatment in both of those conditions.

*Dr. Rich*—I place some arsenic into the cavity, and destroy the life of the pulp. I will remove every bit of that dead pulp that I can get away without attempting to trace out any tortuous root canals. I will not attempt to open those canals by a theory of the line of that root, neither will I try to open up by the acid method. I do open it as far as I can, and pump into it the mummifying paste; then I close it, and I do not expect trouble.

*Dr. Kimball*—If Dr. Rich removes the pulp and finds the action of the arsenic has not been sufficient to destroy the sensitiveness of the pulp, what does he do?

*Dr. Rich*—I do not find it so. I leave it there four days, and find that sufficient.

*Dr. Kimball*—Not always; does Dr. Rich repeat the application then?

*Dr. Rich*—If I had such a case, I would repeat it. I would not leave any life there. When I quoted the case which I did, making a typical case, that was really an exceptional case.

*Dr. Nash*—Would Dr. Rich apply arsenic in the case that Dr. Davenport assumed to be a typical case?

*Dr. Rich*—No; the typist who wrote my paper left out the word "apparent." I do not think it was alive. I think it was a dead pulp—it was just in that condition that it was neither one nor the other.

*Dr. Nash*—I presume Dr. Rich knows that in the past, those who claimed success in this treatment presumed that their success depended chiefly on the fact that no pulp at all was removed.

*Dr. Rich*—That is where I differ with them.

*Dr. Bogue*—If Dr. Rich should leave arsenic in a tooth such as he has described for eight or ten days, what would happen?

*Dr. Rich*—I know what occurs in many cases where the arsenic remains a little over the four days. The patient comes back complaining of pain or soreness.

*Dr. Nash*—If a case presents in a putrescent condition, would Dr. Rich first open the tooth and liberate the gas?

*Dr. Rich*—Yes; my treatment would be to get the case in normal condition first, and then I would fill the root with as much of the paste as I could get in.

*Dr. Nash*—Then Dr. Rich is not as radical a pulp mummifier as he has led us to suppose.

*Dr. Rich*—I am to this extent: I do not use any other method. I claim that the portion of the pulp which is at the apical end is mummified.

*Dr. Rhein*—I would like to ask Dr. Rich how he knows that?

*Dr. Rich*—I do not know, except from some few cases which I have had, the teeth having been extracted for other reasons.

*Dr. Bogue*—Many years ago, Westcott, my old preceptor, put arsenic into several teeth, and the patients went away and did not come back in time. They were gone from two months

to a year. When they came back, there had been no abscesses and to his great surprise the pulp was in condition to remove.

Magitot, in France, used arsenic to allay sensitiveness in excavation. I asked him what he did with the pulps afterwards. He told me they needed no further treatment.

We heard Dr. Davenport's reference—"critters have legs, and they use them." I saw any number of Magitot's patients, and I saw not one patient that did not have from one to half a dozen abscesses. He was in the habit of extracting teeth and replacing them after removing the abscesses. Magitot's cases were followed by abscesses. The question is, do Dr. Rich's patients have blind abscesses that prevent them from biting hard on the teeth?

*Dr. Rich*—If my method causes blind abscesses, my patients do not know anything about them, and I do not. They use those teeth as much as they use any teeth. I have one in my own mouth on which a bridge has abutted for seven years, and I never have heard from it. I use it as I want to.

A vote of thanks was tendered to Dr. Rich for his paper.  
Adjourned.

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## THE NEW YORK INSTITUTE OF STOMATOLOGY.

The Committee appointed by the President to prepare resolutions in reference to Dr. James G. Palmer offer the following:

Whereas, Our fellow-member, Dr. James G. Palmer, has been removed by death, therefore

Resolved, That in his passing from us the Institute, as well as the profession, has met with a very material loss.

Resolved, That we record our appreciation of, and respect for him as an unassuming gentleman; as a practitioner exceeding by far the average in professional skill; and as a friend whose fidelity could never be questioned.

Resolved, That we express our profound sorrow because of his departure and extend to his family our most sincere sympathy.



Resolved, That a copy of these resolutions, signed by the President and Recording Secretary, be sent to the family of Dr. Palmer and that the resolutions be entered on the minutes of the Institute.

GEORGE EMORY ADAMS,  
S. H. McNAUGHTON,  
F. MILTON SMITH.

May 3, 1910.

#### MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry will be held in Boston October 26, 27 and 28, 1910. For information and applications address Dr. G. E. Mitchell, No. 25 Merrimack Street, Haverhill, Mass.

# THE JOURNAL

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### RESPONSIBILITY AND PRIVILEGE.

Sir Francis Bacon said, "I hold every man a debtor to his profession; from the which men, of course, do seek to receive countenance and profit; so ought they of duty to endeavor themselves by way of amends, to be a help and ornament thereto."

While this sage remark was made in the 16th century, no one will gainsay the wisdom of it, and, as applied to present day conditions, it is certainly more far-reaching than it was in the olden times, for to-day there are more professions, and the men who "do seek to receive countenance and profit" therefrom are more numerous.

The youth standing on the threshold of life and looking forward knows that there can be no real success without responsibility. It matters not whether he drifts into business or whether he chooses a profession, he must fit himself to meet emergencies, perform difficult tasks, and to carry responsibilities.

As a student he is responsible to his teachers, and as a young practitioner he is responsible to the families who come under his care. As a successful and mature practitioner he becomes more responsible to the community in which he has made his success and to the profession which has helped him to achieve it.

The influence of an exemplary professional man's life is lasting, and even though his physical activities have ceased, the achievements and the ideals of that man may stimulate the desires, and in a measure shape the ambitions of many who follow.

In a certain sense, therefore, a man is definitely responsible to those who take up the professional work where he has laid it down. If a man acknowledges his personal debt to the profession which has given him "countenance" he will put his best effort into his daily work; he will take advantage of the many opportunities that present themselves to broaden his knowledge and to perfect his workmanship. He will be considerate and sympathetic with those whose interests are in his care, and he will not forget that one of the functions of a profession is to teach, and he will take pleasure in giving freely of his knowledge and advice in order that good may come to those who are enlightened.

He will do charitable work according to his ability; not in a haphazard way, but systematically, with a view to making his effort as effective and far reaching as possible. He will remember that he is a servant of the community, and he will use his legitimate influence to guide the trend of public opinion in matters that bring the people at large into relation with the profession in which he is active.

At personal sacrifice he will willingly give of his time and energy and means to aid and support any and all movements that will advance the standards of his calling, and enhance its usefulness. He will feel an innate dread of any misuse of professional knowledge or abuse of the confidence that the public must necessarily place in the professional man, and will resent the activities of the charlatan.

The responsibility of the professional man to his brother in the same calling is in itself a subject for a lengthy essay, but as a brief expression, suffice it to say that one should guard the reputation of his neighbor as zealously as he would guard his own.

In short, to fulfill the obligation to his predecessors, to his Alma Mater, to his community and to his profession, he must have lived the life of a truly professional gentleman, and, "by way of amends," he will have been "a help" and an "ornament" to his calling.

His diploma, then, would be not only a license to practice, but might be looked upon as a certificate of responsibility worthily conferred early in his career.

The recipient of a diploma from a professional college not only receives the legal right to practice, but he tacitly agrees to assume the burden of responsibility that accompanies it, and he, incidentally, becomes blessed with the privileges that it confers upon him.

The greatest privilege that the diploma confers upon the graduate is that it invests him with the right to serve humanity. It also gives him the privilege of earning an honest livelihood and taking a position among men that is limited only by the scope of his ability and the force of his personality.

In dentistry the practitioner is impressed with what appears to be an increasing prevalence of dental caries and an increasing demand on the part of the people at large for adequate and competent dental services. It may be that caries was just as prevalent a half century ago as it is to-day, but certainly the people of that time did not pay so much attention to its baneful influences as do the people of to-day.

From all quarters of the globe there is now a demand for treatment that will enable people to retain their dental organs and ward off the train of ills that would follow their decay and loss.

This call comes from the medical profession, from boards of health, from societies which strive for the physical improvement of the poor, from educators who realize how defective dental development handicaps the growing mind, and from the needy public itself.

This is a cry that must be answered. Will dentistry, as a profession, measure up to her responsibilities, and will she be awake to her glorious privileges? Will the profession make an organized effort to control and direct the sentiment and action of those in all walks of life who are interested in these matters, or will she, through inertia and lack of appreciation of both responsibility and privilege, allow the direction of the work to fall into the hands of other professions and politicians?

These are questions that only time can answer, but the writer ventures the optimistic prophecy that dentistry will accept and make use of her privileges, and that she will recognize and assume her full responsibility.

WILLIAM DWIGHT TRACY.



A CHEMICAL STUDY OF SALIVA, IN ITS PROBABLE  
RELATION TO THE DECAY OF TEETH.\*BY ALFRED P. LOTHROP AND WILLIAM J. GIES.<sup>1</sup>

## I. INTRODUCTION.

*Mr. President and Members of the Institute*—It gives us great pleasure to present, at your invitation, the preliminary results of our study of possible relations between the composition of saliva and the decay of teeth. We have been engaged in the practical work of this research for a period of about five months. The investigation is still in progress. We are confident that further study will enable us to add much to the modest array of facts to be presented tonight.

Last summer your president did us the honor to call our attention to this important problem. Dr. Howe emphasized the fact that while dentistry has made remarkable advances in the technique of dental *repair*, it has shown very little progress in the art of *preventing* dental disease. Dr. Howe's position on this matter was hopeful and progressive, and his remarks pictured clearly the practical sanitary value of an aggressive and alert investigation of the subject of dental caries. When he asked us whether we would be disposed to take charge of such an investigation, we told him that both the practical importance and the scientific interest of the subject appealed to us strongly, and that we would gladly conduct the proposed research. It has been especially agreeable to carry the work forward under your official auspices, because Dr. Howe's proposals were wholly free from bias in favor of any particular view of the subject, and quite as devoid of prejudice against any previously stated conception of the matter. We have been at liberty, therefore, to do our best to ascertain the truth in this relation without ex-

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\*Read before The New York Institute of Stomatology, May 3, 1910.

This report was originally presented extemporaneously by Dr. Gies. At our request the substance of the address, as given in an official stenographic report of it, was edited by the authors for publication in this journal.—[Ed.]

<sup>1</sup> The experiments described in this paper were conducted before May 1, 1910, in the Laboratory of Biological Chemistry of Columbia University, at the College of Physicians and Surgeons. The results of work completed since that date will be included in a special paper to be published in the near future.

perienicing the narrowing influence of a pet theory to be supported or of an objectionable hypothesis to be opposed. You have asked us to study the question with open minds. We are doing so. We have already tested many probabilities. We have excluded quite a number of "possibilities." We believe we have appreciably narrowed the field in which the explanation of the decay of teeth will ultimately be found.

## II. SALIVA IS NORMALLY VARIABLE IN CONSISTENCE AND COMPOSITION.

Saliva was one of the first biological fluids to receive chemical attention. Very many facts regarding its composition have been accumulated. One of the most striking facts pertaining to saliva is its *inconstancy in consistence and composition*. Thus, in the same individual, it is sometimes very "thin and watery," at other times "thick and viscid." Saliva varies greatly in consistence (viscosity) in an individual at different times of a particular day and on different days of a given period. Dissimilarities in the consistence or viscosity of a particular kind of solution at a given temperature, are, as a rule, expressions of differences in the proportions of the substance or substances dissolved. In the case of normal saliva, even when obtained directly from a salivary gland, there are decided variations in the proportions of contained mucin, salins and excretory products; and there is also marked inconstancy of amylolytic power. Among the leading factors of influence in the causation and alteration of salivary secretion are the psychological state of the individual, the functional efficiency of the salivary glands, the composition of the blood and lymph, the condition of the oral cavity, and the chemical as well as the physical nature of the things taken into the mouth. These influences affect (directly or indirectly and immediately or after a time) the quality and quantity of the saliva that may be secreted in a given period, from a particular salivary gland or from the salivary glands collectively.

In brief, inconstancies in the chemical and physical qualities of saliva may be expressions of local or systemic normal variations, and may also be due to exceptional circumstances. Eccentricities of chemical composition are well illustrated by the occurrence of iodide in saliva after the introduction of such material

into the body. One of the clinical methods of determining whether the motions of the stomach are normal, includes the oral administration of a small amount of sodium iodide in a gelatin capsule. The capsule prevents the escape of iodide in the mouth and esophagus, but, in the normal stomach, the capsule is quickly digested and the liberated iodide dissolves in the gastric liquid, which is promptly ejected through the pylorus. After its absorption through the intestinal wall into the blood, iodide soon reaches the salivary glands and is quickly excreted in the saliva. A foreign substance is thus eliminated from the blood into the saliva. Saliva is an efficient carrier of various excretory as well as "foreign" substances. The excretory constituents of saliva consist not only of normal waste materials, but also include various products or representatives of disease. For this reason it is becoming obvious to clinicians that salivary studies promise to throw new light upon pathological states of various kinds.

### III. THE NEW ANALYTIC WORK.

A. PROVISIONAL WORKING PROGRAM. With these important facts regarding natural variations in the chemical and physical properties of saliva clearly in mind at the outset, we proceeded with our work under the general guidance of the following provisional *assumptions*:

- a. Dental caries is due to influences and conditions primarily *external to the tooth* involved.
- b. A tooth decays through the influence of substances in, or conditions of, the *saliva*, or both.
- c. If propositions *a* and *b* above are wholly correct, then saliva from cases of *relative immunity* must be comparatively free from the substances or conditions that induce carious processes.
- d. If the latter deduction (c) is well founded, strictly comparative data for the composition of selected specimens of saliva should reveal the constant presence of chemical factors in cases of decay that are absent from saliva in cases of immunity.
- e. But, if correctly comparative analytic data pertaining to selected specimens of saliva should *fail* to reveal chemical

constants responsible for dental caries (d), such decay might be due to salivary *conditions* that cannot be detected by chemical examination of saliva; *or else one or more of the foregoing assumptions might need revision or be wholly unfounded.*

*(The reader is requested to note particularly that this series of assumptions was formulated as a provisional working program and does not represent final conclusions from the analytic data obtained.)*

B. METHODS OF SALIVARY COLLECTION. Our first practical problem in testing the validity of these assumptions was the proper collection of saliva from typical cases. Members of the Institute co-operated cheerfully and effectively in this connection.\* Through their kindness saliva was obtained in their offices and under their personal direction from willing patients without inconvenience or annoyance to any one concerned. As a rule, the saliva obtained for us by dentists was collected by patients who were about to be given dental treatment. Typical cases of decay, erosion, pyorrhea and relative immunity were selected. Full clinical records of each case were submitted by the dentist in charge. Every effort was made by each collaborator to respond to all our requests. In each case the patient, without the aid of any secretory excitant, directed saliva intermittently from the mouth to a little funnel in a small bottle. This simple method of collection was devoid of appreciable chemical defects and presented no inherent psychical objections. In most instances the isolated saliva was essentially natural in its production, and practically unaffected in its collection. Some patients were unable, apparently on account of nervousness, to secrete an adequate supply of saliva. There is no reason to think, however, that psychical influences changed the chemical nature of the collected specimens sufficiently to prevent the detection of possible salivary factors in any of the cases of observed decay from which saliva was submitted to analysis. The desired volume of saliva was usually obtained in a few minutes at a normal rate; and, with the stopper of the bottle tightly in place and the bottle held

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\*In a future paper, in which the details of our work will be presented, we shall also give the names of the members of the Institute who have co-operated with us.



securely in a suitable box, it was promptly taken to our laboratory where it was immediately subjected to analysis. Eighty-two selected specimens were received from dentists. All of the specimens were collected in the morning.

We also obtained about the same number of specimens of saliva from freshmen in the Columbia Medical School. We invited the co-operation of these young men in order conveniently to extend the field of our observations and especially in the hope of finding additional cases of special immunity. Drs. J. Morgan Howe, G. S. Allan and J. K. Burgess, of the Institute, gave considerable attention in our laboratory to thorough oral examinations of these students, and prepared clinical records of their findings in the case of each individual. There were no cases of pyorrhea or erosion among these young men. Our chemical studies of saliva from these particular subjects were accordingly confined to specimens from selected cases of relative immunity and plain decay. We obtained saliva in each of these instances by the simple collection process described above. The students collected the saliva at their convenience during a regular three-hour morning exercise in physiological chemistry in our laboratory. As prospective medical men they readily caught the spirit of the investigation. Collection of saliva was not a new experience for any of them. They cheerfully provided material in abundance. Unfavorable psychical influences were obviously absent from practically all these cases.\*

C. SALIVARY EXAMINATIONS: TABULATED DATA. The copies of several summaries now before each of you (tables 1 and 2, given on pages 267 and 268) will help us to present clearly the general results of the work already accomplished. In the first of these tables (page 267), we present the average results in two main groups: the first group (I) pertaining to 82 specimens of saliva supplied by dentists; the second group (II) relating to 44 specimens of saliva obtained from medical students. In the second table (page 268) we give certain comparative data regarding the quantities of crude mucin obtainable from 41 specimens of saliva.

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\*The names of the many Columbia medical students to whom we are indebted for assistance will be given in a future paper containing the detailed results of our work.

D. RESULTS OF THE EXAMINATIONS. A. CONSISTENCE. We have already stated the fact that saliva varies greatly in consistence (viscosity) in an individual at different times of a particular day and on different days of a given period. This variation in viscosity seems to be chiefly due to fluctuations in the proportions of contained mucin. We have been assuming, from the very beginning of this study, that salivary mucin is involved in the *inauguration* of carious processes. Therefore, we have made careful comparative observations pertaining to the consistence of the available specimens of saliva from the standpoints of general viscosity, contents of total solids and mucin, and yield of inorganic matter after desiccation and cautious incineration.

TABLE 1.

## SALIVARY EXAMINATIONS:

## GENERAL SUMMARY OF AVERAGE DATA

## I. Eighty-two specimens of saliva supplied by dentists.

## A. DATA PERTAINING TO CONSISTENCE.

Degree of Viscosity	Immunity 19 Specimens	Decay 39 Specimens	Erosion 19 Specimens	Pyorrhea 12 Specimens
Thin .....	63%	41%	58%	67%
Medium.....	31%	26%	10%	25%
Thick .....	6%	33%	32%	8%

## B. CHEMICAL DATA.

Constituents	Results	No. of Specimens	Results	No. of Specimens	Results	No. of Specimens	Results	No. of Specimens
Mucin (photometric scale).....	<b>2.6</b>	12	<b>2.7</b>	29	<b>3</b>	13	<b>2.9</b>	10
Total solids per 10 grams: (in milligrams) .....	<b>48</b>	9	<b>41</b>	13	<b>43</b>	5	<b>47</b>	2
Ash per 10 grams: (in milligrams).....	<b>15.5</b>	9	<b>14</b>	13	<b>12</b>	5	<b>15.5</b>	2
Acidity: c.c. of n/200 NaOH solution per 10 c. c....	<b>7.9</b>	19	<b>6.8</b>	36	<b>8.8</b>	19	<b>10</b>	12
Sulphocyanate: 1 part in x thousands	<b>40</b>	16	<b>48</b>	33	<b>38</b>	16	<b>20</b>	9

TABLE 1—(continued).

## II. Forty-four specimens of saliva obtained from medical students.

## A. DATA PERTAINING TO CONSISTENCE.

Degree of Viscosity	Immunity 25 Specimens	Decay 19 Specimens
Thin .....	72%	58%
Medium.....	20%	37%
Thick .....	8%	5%

## B. CHEMICAL DATA.

Constituents	Results	No. of Speci- mens	Results	No. of Speci- mens
Mucin (photometric scale).....	2.7	25	2.8	19
Total solids per 10 grams: (in milligrams) ....	45	11	46	11
Ash per 10 grams : (in milligrams) ....	14.1	11	14.4	11
Acidity : c.c. of n/200 NaOH solution per 10 c.c. ..	7.5	25	7.6	19
Sulphocyanate : 1 part in x thousands	33	25	23	19

1. *Degree of viscosity.* No effort was made to determine viscosity with absolute accuracy. We used an empirical standard in three grades expressed by the words thin, medium, thick. Careful examinations of relative fluidity gave the percentage "data pertaining to consistence" that are recorded in Table 1.

A review of our figures in this connection shows that there is no special relation between the viscosity of a given fraction of saliva and the condition of the teeth of the individual secreting it. The salivas from the two groups of immunity cases and the group of pyorrhea cases were practically the same in consistence. About two-thirds of the number of specimens in each of these three groups were thin and less than one-tenth of the number were thick. The independent variability of viscosity is shown with special clearness by the percentage data for thick specimens in the two groups of cases of decay—in one group one-third of the number were thick, in the other only one-twentieth of the

number were thick. Our data in this connection show that the proportion of *medium* viscosities was much lower for the erosion group than for any other, although the proportions of *thin* salivas were identical for the group of erosion cases and the *second* group of cases of decay; and the proportions of *thick* specimens were the same for the group of erosion cases and the *first* group of cases of decay.

2. *Mucin content.* (a) *As determined by a photometric method.* We believe that salivary mucin favors the onset of dental caries by facilitating local attack by microorganisms. Mucin, in its simplest form, is a glucoprotein acid—a conjugate protein, consisting chiefly of radicals of protein and carbohydrate substances. Mucin occurs in saliva combined, for the most part, with sodium, and potassium, and other commonly occurring basic elements. These mucin compounds are “acid salts,” *i. e.*, salts which are not saturated with basic elements, and which, therefore, will react with more basic material. *A given solution of such salts may be acid to phenolphthalein, neutral to litmus and alkaline to methyl orange.* Solutions of mucin salts, *e. g.*, saliva, are more or less viscid—*concentrated* solutions are as viscous as very thick mucus.

We have already expressed our conviction that salivary mucin favors the onset of dental caries by facilitating local attack by microorganisms. We think this favoring action is primarily a physical one, dependent on the viscosity of mucin solutions and the consequent stickiness of mucin layers or deposits. Bacteria and fungi would be entangled and held in such sticky films on teeth, but would not be affected unfavorably in their growth and multiplication there by the contained mucin or mucin salts. *In fact, both mucin and its salivary salts provide nutrient material for microorganisms.*

As has already been stated, mucin occurs in saliva combined, for the most part, in acid salts of several kinds. Mucin itself may be precipitated from saliva by the addition of acid “strong” enough to displace the mucin radical in one or more of the acid salts originally containing it. In this respect the behavior of mucin is similar to that of caseinogen of milk, and of phosphoprotein of urine. When saliva is slightly acidified with acetic acid, for example, mucin itself is precipitated. The acidified



saliva may be merely opalescent at first, *i. e.*, the precipitated mucin may be suspended in the form of ultramicroscopic particles, but, if the mixture is thoroughly stirred or is kept undisturbed for a time, such particles usually agglutinate promptly into visible flakes.

The gravimetric determination of the amount of mucin *obtainable* from saliva is primarily dependent upon the use of a comparatively large volume of that secretion—much larger, in fact, than any volume we received from our dental collaborators. Other methods are less accurate. In our preliminary series of observations in this connection we used a simple photometric method for the closely approximate, as well as speedy, estimation of the *relative* amounts of contained mucin. Graded aqueous suspensions of clean infusorial earth were the empirical standards employed. Such suspensions are very similar in appearance to filtered saliva which has been rendered turbid with acid. Five such suspensions were made in volumes of 1,000 c. c. of distilled water and containing respectively 0.125, 0.25, 0.5, 1 and 2 grams of infusorial earth. Samples of each suspension, after perfect mixture, were transferred to test tubes 3 inches long and 3-16 of an inch in diameter. The tubes were sealed and numbered from 1 to 5 in the order of increasing opacity. The standard opacities could be promptly restored as desired by thorough shaking of the tubes. Each standard, as thus elicited for comparisons, was always the same in a given tube.

In the determinations of *relative* mucin content, filtered saliva plus 2 per cent. acetic acid (on a basis of uniform proportions and contained in test tubes of the standard size) was then compared with the standard suspensions. The saliva under examination was given the serial number of the tube containing the standard suspension of equal opacity. As a rule there was little difficulty in discerning close agreements between the turbid tubed saliva and a standard suspension-opacity. *Relative* differences could be approximately expressed in this way, even though no knowledge of *absolute* values was secured. In the table (1) the higher the grade of the numeral, the greater the indicated proportion of salivary mucin.

As in the case of viscosity, the comparative data in this regard suggest that there is no peculiar relation between the proportion of

mucin in a given fraction of saliva and the state of the teeth of the person secreting that particular specimen. The differences among the figures are not so great as we expected to find them. The data for mucin content agree in a general way with those for viscosity. Theoretically there should be a closer parallelism between the data for viscosity and mucin content than that shown by the table, but the practical difficulties in the way of making absolutely correct estimations in these particular connections (to which your attention has already been called), have prevented our showing the finer distinctions that we would have preferred to elicit. The observed variations from the theoretical parallel may be chiefly due, however, to the fact that the viscosity data were obtained in tests applied to *all* the available specimens, whereas the photometric averages were calculated from the data of observations on *less than the full number* of available specimens of each group. This incompleteness was due to the necessity of omitting tests occasionally on account of insufficient volumes.

The mechanical qualities of salivary mucin make it obvious that carious processes, if induced by microorganisms, would be facilitated by the adhesion to the teeth of viscid layers of that material. We were reluctant, therefore, to regard the foregoing results as conclusive, and proceeded to make additional determinations by a more acceptable process.

(2. *Mucin content, continued*). (b.) *As determined by precipitation with alcohol*. In our desire to use an accurate method for the quantitative determination of mucin, we were confronted by a number of difficulties. We have found that acid-precipitable proteins of the mucin type cannot be quantitatively precipitated with acid. Some of the associated simple protein is "carried down" in the mucin flakes and some of the mucin is not flocculated by the acid. Methods of mucin quantitation that are based on acid-precipitation are valuable in clinical connections for the estimation of *relative* amounts, but are not satisfactory for the establishment of absolute values. In fact, no method thus far described is an adequate one from the standpoint of strict chemical accuracy.

In this predicament it seemed best to use a precipitant which would completely precipitate mucin in its natural salt forms. We chose alcohol for this purpose. Unfortunately, however, the

proportion of alcohol which is required to completely precipitate the mucin salts from saliva is sufficient, also, to flocculate practically all the associated simple protein matter, thus causing a plus error in the estimations. This plus error is less objectionable, however, than the minus error due to incomplete precipitation by acid. Besides, the alcohol precipitation process is more expeditious. About 40 specimens of saliva were obtained from our medical students for these particular estimations.

In our determinations of the "total alcohol-precipitate," we used *filtered* saliva. Foreign particles were eliminated in this way but any suspended mucin was also unavoidably removed and lost. Errors of this kind were negligible, we think, in these *comparative* observations. One volume of saliva (5-25 c.c.) was mixed with four volumes of 95 per cent alcohol. After standing over night for its complete sedimentation; the precipitate was filtered on a weighed, dry, ashless paper, then thoroughly washed with a mixture of 1 volume of water and four volumes of 95 per cent. alcohol, later dried to constant weight at 100°C and finally weighed. The weighed precipitate was cautiously incinerated and the ash weighed. The ash in these cases consisted of salins originally adherent to the precipitate, as well as compounds produced from the mucin salts, and associated proteins, by the oxidation process.

Our data in this connection are given in Table 2 (page 273). There is nothing in the results to show that the specimens of saliva from cases of decay were appreciably different in mucin content from those representing cases of relative immunity. As usual, we observed marked variations in each group of results. There is comparative uniformity, however, in the data pertaining to the same individual. We can assure you that in these cases, as in all the others, the observed variations are not due to preventable analytic deficiencies.

It is evident that the proportion of mucin in a fraction of saliva at any given time furnishes little or no indication of the amount of mucin actually adherent to the teeth, nor of the tendency for such adhesion to occur or cumulatively to increase. A relatively large quantity of mucin might adhere to the teeth of a particular individual, in 24 hours, without causing an appreciable

diminution of the amount of mucin in any fraction of the saliva that would be available at a given time.

TABLE 2.

Comparative Amounts of Mucin from Saliva: Crude Mucin (Alcohol Precipitate) per 10 c. c. of Saliva.

## I. Relative Immunity.

Case No.	1st specimen		2nd specimen		3rd specimen	
	Dry	Ash	Dry	Ash	Dry	Ash
	milligrams		milligrams		milligrams	
1	8	2.4	8	2.6	11	2.6
2	15	2.7	16	3.0		
3	10	1.6				
4	11	2.8				
5	15	2.5				
6	10	2.8	11	3.2		
7	10	2.4	9	2.1	10	2.1
8	21	3.5				
9	9	2.2				
10	11					
11	13					
12	18					
13	13					
14	12					
15	16					
16	15					
17	12					
18	16					
19	12	2.0	10	2.1	11	2.8
20	21					
Average	13.4	2.5	10.8	2.6	10.7	2.5

Average, all specimens: Dry, 12.8 mgm.; Ash, 2.5 mgm.

## II. Decay.

Case No.	1st specimen		2nd specimen	
	Dry	Ash	Dry	Ash
	milligrams		milligrams	
21	13	1.5		
22	9	2.2	10	2.3
23	20	3.3		
24	12	3.5	15	3.2
25	16	3.2		
26	12	2.9		
27	16	3.1		
28	10	2.2		
29	17	3.6		
30	13	2.8		
31	10	2.2		
Average	13.4	2.7	12.5	2.7

Average, all specimens: Dry, 13.3 mgm.; Ash, 2.7 mgm.

3. *Total solids.* Dissimilarities in the consistence or viscosity of a particular kind of solution at a given temperature are,



usually, as we have already stated, expressions of differences in the proportion of the substance or substances dissolved. Although the supply of saliva was insufficient in most cases, we determined, by the best gravimetric process, the total amount of dissolved matter in a few of the specimens from each group of cases. The "total solids" referred to in Table I include the mucin and other salivary proteins, also the salins and such additional constituents as do not volatilize during ordinary processes of desiccation. In these estimations, quantities of *filtered saliva*\* varying from 1.5 gram to 10 grams (as determined by the volume of the available supply in each case) were evaporated to ordinary dryness in weighed porcelain crucibles on water baths and the residues then rendered perfectly anhydrous over sulfuric acid in vacuum desiccators, where they were allowed to remain until their masses diminished to constant weights.

Again we see a striking sameness of the averages. Once more there is obviously a lack of quantitative peculiarity corresponding to the particular condition of the teeth. In this case, also, it is possible (though not probable) that determinations of the total solids in *every* specimen would have developed significant average results.

4. *Ash.* The figures for the quantities of ash obtained by the cautious incineration of the total solids are no more significant than those for the total solids.

Our data for consistence (viscosity), contents of mucin and total solids, and yield of ash, have thrown no light on the main question. It is probable that the ordinary *normal fluctuations* in salivary viscosity, as well as in the proportions of contained mucin and dissolved matter in gross, are great enough to disguise any *quantitative* relations of these factors to carious processes, if any such interrelations exist.

B. REACTION. In every instance we carefully determined the "reaction" of the specimen of saliva to at least three indicators: phenolphthalein, litmus and lacmoid. We gave considerable attention to this point because of the very good reason for believing that the production of acid by the action of micro-organisms is an important factor in the local disintegration of enamel. In practically

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\*Our reason for using filtered saliva in such determinations has already been stated (page C).

every instance the reaction was *alkaline to both litmus and lacmoid*. In *every* case the reaction was *acid to phenolphthalein*.

The "reaction" of the saliva has been the subject of considerable nonsensical comment. Many who write about this matter appear to be unaware of the fact that *a given solution may seem to be acid, neutral and alkaline at the same instant*—may, for example, be acid to *phenolphthalein*, neutral to *litmus* and alkaline to *methyl orange*. Thus, specimens of urine are frequently found to be *strongly acid* to phenolphthalein, *moderately acid* to litmus and *decidedly alkaline* to methyl orange. Urine is often *amphoteric* to litmus, *i. e.*, both acid and alkaline to that indicator. A solution is *neutral* when its concentrations of hydrogen and hydroxyl ions are absolutely equal. No coloric "indicator" shows that equality; each of them indicates neutrality at a point where there is a *definite ratio other than equality* between the hydrogen and hydroxyl ions. This "definite ratio" varies with the quality and quantity of the indicator, and in harmony with the specific combining tendencies of the latter.

*Phenolphthalein* is one of the most satisfactory indicators. As ordinarily employed, *i. e.*, in alcoholic solution, it is colorless, but with a trace of alkali (hydroxyl ions) it yields a bright red color. On neutralizing this red solution with acid, or on adding to it an excess of acid, the solution is returned to the colorless condition *without any intermediate colorations*. Titrations can be made very sharply and decisively with phenolphthalein. It is more sensitive than litmus. Unlike litmus, phenolphthalein does not have three color phases; therefore, it does not induce the disconcerting doubts that occur at or near the neutral point in such a composite liquid as saliva when litmus is used. The disadvantages of other indicators need not be emphasized. It seemed more important for us to express the reaction of the saliva in terms suggestive of the saliva's tendency to combine with additional *basic* material (as determined with the aid of one of the most sensitive indicators, phenolphthalein) than to express the reaction in terms indicative of the capacity of saliva to combine with more *acidic* substance (as determined with an indicator of less utility, such as litmus). This decision was obviously in the interest of the most significant and most accurate expression of reaction.

Our titrations were applied to 1 c.c. portions of saliva.

Table 1 (page 267) gives the average number of cubic centimeters of n/200 sodium hydroxid solution required to neutralize 10 c.c. portions of saliva from each group of cases, *i. e.*, the acidity of 10 c.c. portions of the average saliva in each group was equal to the alkalinity of the corresponding volume of n/200 sodium hydroxid solution *or to any equivalent of that alkalinity, such as basic material from enamel.*

The figures show that the acidity was least in the specimens of saliva from the cases of decay and most in the salivas from the cases of pyorrhea. The differences are not great enough, however, nor are the individual titration results sufficiently constant, to warrant emphasis on any of these points. No significant relationship between the acidity of the average specimen of saliva to phenolphthalein and the condition of the teeth is shown by these results. It is possible, however, that the comparatively high acidities of the specimens from the erosion and pyorrhea cases are more significant than these preliminary results indicate.

Before turning to the remaining items in our tables, we desire to call attention to two sets of observations of some interest and significance, which are not referred to in the summaries.

C. SPECIAL FEATURES NOT REFERRED TO IN THE TABLES.—

1. *Special acidity of specimens of saliva obtained from subjects immediately after their awakening from a night's sleep.* Soon after we undertook this work we were impressed by the probability that oral bacteria and fungi produce acid in their growth on the nutrient materials in the saliva, buccal liquids and food particles adherent to and held between the teeth. We believed that such acid production would be greatest during periods of sleep, because the oral conditions are then most favorable for the greatest multiplication and dental retention of microorganisms, as well as for the most marked accumulation and local action of bacterial products. Such being the case, the mixed oral liquid and true saliva obtained from a subject in the morning, immediately after his arising, might be expected to manifest special acidity. The following typical data from our records pertaining to one individual on two successive days show that this view of the matter is correct.\* The titration indicator was

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\*Additional data will be given in a future paper presenting our results in detail.

phenolphthalein. The teeth of the subject were above the average in all respects.

FIRST DAY.				SECOND DAY.			
Arose at 8 o'clock.				Arose at 7 o'clock.			
Had breakfast at 8.15.				Had breakfast at 8.20.			
Saliva	Acidity of 10 cc.			Saliva	Acidity of 10 cc.		
obtained at	of mixed saliva.			obtained at	of mixed saliva.		
8 A. M....18	cc. of n/200 NaOH			7 A. M....28	cc. of n/200 NaOH		
10 A. M....11	" " " "			8.15 A. M.. 8	" " " "		
3 P. M....10	" " " "			8.45 A. M.. 6	" " " "		
5 P. M....10	" " " "			10.30 A. M.. 8	" " " "		

Fractions of saliva obtained during the hours of physical and mental activity fail to show what is obvious regarding the comparatively quiescent liquid which is secreted into the mouth during periods of sleep. Any influences of mucin as an *adhesive* medium, and of bacteria and fungi as corrosive and *enamel-puncturing* agents, in the initiation of carious processes, are doubtless exercised to their greatest degrees during periods of sleep.

2. *Nitrite*. It has long been known that saliva normally contains nitrite in small proportions. The full significance of this occurrence cannot be stated. The salivary glands have been regarded as the producers of the nitrites contained in saliva, perhaps by simple reduction of nitrates; although it is obvious that other tissues may yield nitrites and that saliva, like urine, may be their excretory carrier. At all events, there appears to be no relation of any definite kind between the proportion of salivary nitrite and the condition of the teeth. Nevertheless, in our desire to keep perfectly open minded in all phases of our work, we tested practically every specimen of saliva for nitrite by the customary process and, as a rule, obtained a positive reaction.

At the beginning of his investigation we familiarized ourselves with certain of the fluctuations in composition that the saliva from normal individuals ordinarily exhibits. The first peculiar fact that we noticed in those earliest examinations was the absence of nitrite from the fractions of saliva obtained by a number of normal individuals immediately after arising, and before breakfast, together with the recurrence of nitrite in the fractions secreted by the same persons immediately after breakfast and during the rest of the day. For some time in our



research in this connection every fraction of saliva that had been collected *before* breakfast was found to be free from nitrite, and every specimen collected *after* breakfast contained it. At that time we were hearing much about *bleached* flour and the deleterious action of the nitrite in bread made from flour prepared by the usual bleaching process. It occurred to us that possibly salivary nitrite is merely nitrite which has been introduced into the body with bread stuffs and excreted by the salivary glands. We thought, further, that possibly nitrite fails to appear in specimens of saliva collected before breakfast because all the nitrite ingested with bread in the last food eaten the previous night is wholly out of the system by that time. This theory required the further assumption that all specimens of saliva which responded positively to the nitrite test in the hands of previous observers, contained nitrite that had been derived from food prepared with bleached flour or other nitrated material.

Although the latter assumption did not appear to be warranted, we immediately looked into the question thoroughly from every essential standpoint. We soon learned, to our disappointment we admit, that the occurrence of nitrite in the saliva is not dependent on the ingestion of food prepared from bleached flour; and, what is still more important, we found that some specimens of saliva which were collected before breakfast contained considerable nitrite. Fortunately we had assumed a skeptical attitude toward the opinion that was supported by our earliest results—a fairly large number of them in perfect accord and pointing in unison to a very definite and attractive conclusion. If it had not been for our habit of combating our natural partiality to our own surmises, the number and harmony of our earliest results in this connection would have misled us into making an untruthful announcement. It is regrettable that certain writers on scientific subjects, dental chemistry among them, do not show more inclination to withhold public presentation of their guesses as facts until they are assured that their assumptions withstand the careful scrutiny and experimental examinations that sound scientific method requires.

We have not yet made a direct inquiry into the causes of the quantitative fluctuations of salivary nitrite. We do not know the particular reasons for the frequent absence of nitrite from frac-

tions of saliva secreted by subjects immediately after their awakening from a night's sleep. The frequent absence of nitrite from the first fractions of saliva in the morning would be attributed by some observers to the comparatively quiescent state of the salivary glands and their consequent failure to produce or excrete nitrite. Others would infer that although nitrite is, as a rule, actually excreted continuously into the saliva, its quantity there may be affected by micro-organisms—entirely removed in some cases and diminished in proportion in others. We hope to learn the real reason at an early date. We believe that, under the above-mentioned special conditions, *oxidases* are involved in the removal of nitrite (by oxidation into nitrate), and that microorganisms increase the supply of the oxidizing agents.

D. SULFOCYANATE. Sulfocyanate, like nitrite, has long been recognized as a normal salivary constituent. It has been regarded by some as the cause of decay, by others as a preventive of caries. Many have assumed that sulfocyanate, as it occurs in saliva, has no material influence on teeth, directly or indirectly, one way or the other. Our results accord with the latter view.

Our method for the determination of sulfocyanate was a simple modification of the classical process. Standard aqueous solutions of ammonium sulfocyanate, containing 1 part of sulfocyanate in 5,000, 10,000 and so on up to 200,000, were prepared in adequate volumes for use in all the determinations. We placed 1 c.c. portions of these solutions into a corresponding number of porcelain crucibles of uniform size. The crucibles were aligned in the order of the concentrations of their contents. To each of the 1 c. c. portions of standard solutions were then added, from dropping bottles, 2 drops of a stock 10% solution of hydrochloric acid and 3 drops of a stock 5% solution of ferric chlorid. A series of standard colorations was obtained in this way and in this manner could be accurately duplicated at desire. The colorations were identical with those in the salivary tests, and afforded a constant and satisfactory basis for accurate comparisons.

Exactly 1 c.c. of the saliva to be tested was placed in a crucible of the size containing the color standards. This volume of saliva was given exactly the same treatment with acid and

ferric chlorid as that accorded the 1 c.c. portions of the standard sulfocyanate solutions. The resultant color was matched with its equivalent in the standard series and, the content of sulfocyanate in both matched samples being the same, the proportion in the particular specimen of saliva was thus directly established.

The smaller the sulfocyanate figure in the table (1), the *greater* the proportion of sulfocyanate in the saliva. It is needless to dwell on the obvious fact that there were no definite relationships between the sulfocyanate contents of the fractions of saliva under examination and the conditions of the teeth of those who secreted the specimens. The difference between the averages for saliva from the two groups of cases of decay emphasizes the lack of significant correlations.

#### IV. THE INADEQUACY OF SALIVARY ANALYSIS FOR THE DETERMINATION OF CAUSATIVE FACTORS IN DENTAL CARIES.

As we proceeded with this work, two of our earliest deductions were given cumulative emphasis. These deductions were the following ones:

A. That the *composition* of a given *fraction* of saliva bears no definite relation to the condition of the teeth of the person secreting that fraction and, in any individual, may normally differ considerably from the composition of other fractions.

B. That *causative* chemical factors in decay at any point, even if wholly external to the tooth, are *very small in proportion at any moment* and, if flushed into any ordinary fraction of saliva, are insufficient to affect the composition of that fraction in any significant degree.

In brief, our results drove us from the wide region of salivary analysis to the narrower field of localized, external dental conditions. We continued to rely in a general way upon the first two of the five assumptions which were summarized at the beginning of our remarks (page ). We felt, however, that any "substances in, or conditions of, the saliva" which bring about decay are substances, or conditions, or both, that affect the teeth *continuously but insidiously*. *Substances* which might be removed from or added to saliva, in the amounts involved in decay at any moment, without rendering the composition distinctive! *Conditions* which might be locally effective and yet be generally incon-

spicuous, even ordinarily indistinguishable! These thoughts supported the conclusion that mucin is probably the *salivary substance* which is particularly influential in the development of local conditions favoring the onset of dental decay. The agents which seem to be most active in maintaining the *conditions* that propagate the carious process are non-salivary factors—bacteria and fungi. The chemical substances that may be reasonably supposed to act directly and destructively upon teeth are such as are locally produced by bacteria and fungi—acids and enzymes primarily.

During the past twelve years we have conducted numerous researches in our laboratory on the mucoids and mucins. These substances, when treated with alkali and other basic materials, form viscid, sticky solutions, which, if very concentrated, are like semi-solid mucus. When saliva is concentrated by evaporation it acquires such a consistence. It is easy to understand that, under ordinary oral conditions, salivary mucin tends to form viscid films and layers on the teeth. Such sticky coatings entangle and hold bacteria by the millions, and also provide nutrient media for the growth and multiplication of microorganisms. Unless they are mechanically removed, mucin layers tend to thicken by accretion and to harbor an increasing number of bacteria and fungi. Water and other necessary nutrients are supplied to the microorganisms in such mucin plaques by diffusion from saliva and from liquid food, as well as from disintegrating food particles that are held on and between the teeth. Special nutrient efficiency of the saliva, as determined by its various constituents, qualitatively and quantitatively, may be an important predisposing factor in dental caries by favoring the prolific growth and particular sustenance of microorganisms throughout the oral cavity. In like manner, the bacterial products diffuse in one direction into the free saliva and liquid food masses, and also pass, in the opposite direction, against and along the tooth surfaces. During sleep, when the oral and dental surfaces are relatively unaffected by mechanical influences, and when saliva flows sluggishly if at all, bacteria and fungi accumulate at particularly rapid rates and produce their products in comparatively large and accumulated proportions. These views harmonize with our observations on the relatively high acidities of fractions of saliva which were



obtained from subjects immediately after their awakening from a night's sleep. As we have already stated, we believe that this increased acidity was due to microbic production and not to acid elimination from the salivary glands. We think the increased acidity is detectable, in such cases, because it represents an *accumulation* in a *stagnant* liquid—something that cannot readily occur in a cavity bathed by a fluid which is frequently removed from that cavity, as is the case with saliva in the mouth at all times except during periods of sleep. May not analysis of fractions of saliva be unproductive of results that explain carious processes for the same reason that the analysis of water from the mouth of a river might fail to show the cause of certain very obvious though gradual corrosive effects at particular places on its banks? Liquid agents of such local disintegrations might be generated continuously in small quantities at various points on the banks and, running over the banks into the river, might be not only changed in part by reactions with substances in the banks but also attenuated by the river volume into proportions too minute for chemical detection in any ordinary specimen of the water taken at random. In such cases, we should wish to examine the water at or very near the point where the disintegration material entered the river, in order to secure more favorable conditions for the detection of the corrosive factors. Or, better still, we would make a chemical examination of the disintegration process and products *at their sites* on the river banks themselves.

#### V. THE PROBABLE INFLUENCE OF MUCIN AND MICROORGANISMS IN THE CAUSATION OF CARIOUS PROCESSES.

As we have already indicated, very soon after this work was inaugurated, we realized the probability that bacteria and fungi are the primary dynamic factors in carious processes, and that mucin provides an adhesive medium for the initial attachment and local accumulation of the offensive organisms. Last December we mentioned these views in some detail to your honored president and were gratified to find them in accord with opinions previously expressed by others. Our past acquaintance with mucin led us, at that time, also, to suggest to Dr. Howe, that mucinous coatings and deposits can probably be most effectively disintegrated with *acid* media.

Mucin occurs in saliva, and apparently also on dental surfaces, primarily as acid-salts in concentrated colloidal solution. When viscid mucinous coatings are treated with basic material, such as carbonate of an alkali or an earthy element, the mucin mass becomes superficially more smeary and slippery by reason of the production of more soluble mucin salts *at the surface*. Complete mechanical removal of a mucin plaque from a tooth is facilitated by the addition of a *basic* material that renders the mucin superficially more viscous, but the slippery surface thus produced may make the application of considerable friction necessary for the detachment of the plaque. On the other hand, when a viscid, mucinous deposit is treated with *acidic* material, the mucin mass is completely disintegrated by a curdling or agglutinative process, the particles are devoid of adhesiveness to smooth surfaces, stickiness disappears because of the precipitation of caseous mucin itself, and the entire disorganized mass may be readily flushed away.

#### VI. SUGGESTED USE OF "FOOD ACID" FOR THE REMOVAL OF MUCIN PLAQUES FROM TEETH.

The foregoing facts are responsible for our suggestion to Dr. Howe that diluted vinegar or common fruit juices—*acid media ordinarily present in food*—may be very helpful agents in the removal of mucinous masses from teeth, especially if applied directly with a suitable instrument. It is probable that the cleansing effect of such treatment would be less harmful to the teeth than the frictional operations now in use for similar purposes. That this suggestion is not as radical as it may appear to be is obvious from the fact that the effects of occasional *well directed* treatments of the teeth with *food acid* could not be more deleterious than the influence of the same materials in the mouth, and on the teeth, when ingested with food.

#### VII. GENERAL CONCLUSIONS.

Our data fail to show any definite relation between the general composition and qualities of a given fraction of saliva and the condition of the teeth of the individual secreting it. This fact has made it seem inexpedient to conduct a more detailed inquiry at present into possible salivary features of leading types of dental disease processes. That the *systemic condition* of the

individual is an important factor in susceptibility to dental caries is a conviction that we cannot dismiss. Nevertheless, direct external attack upon teeth by microorganisms appears to be the most important single factor in the carious processes. Mucinous plaques afford favorable conditions for such external attacks. We shall be glad, with your approval, to project our further study along bacterio-chemical lines, in the hope that much more light can be thrown upon the very interesting and important, though elusive, facts of dental decay. For the furtherance of that work we cordially invite your personal interest and professional counsel.

#### DISCUSSION.

*The President*—We are favored in having with us Mr. H. Carlton Smith, lecturer on Dental Chemistry in Harvard Dental School, and we shall be very happy to hear from him in the discussion of this subject.

*Mr. H. Carlton Smith*—It always gives me pleasure to meet with the Institute, and particularly to-night, because I have learned much from this very valuable address by Dr. Gies. I am glad to see Dr. Ferris and others here, from whom I hope we shall hear later.

The speaker said he went at this subject with no preconceived ideas to substantiate, and I think that this in itself is worthy of note. There are too many investigations which are not undertaken in this way.

When I was here a year ago I found the dentists in New York were testing saliva for nitrites, but being unable to find satisfactory reason for it, have omitted this test from my own analyses. During the winter, however, our experimental work gave undoubted evidence of the existence of one, possibly of two, oxidizing enzymes in the saliva.

These important ferments to which the speaker has referred furnished, perhaps, the reason for our nitrite test. The relation between the two being at once suggested by the fact that in inorganic nature there are two classes of organisms, which convert nitrogenous matter first into nitrites, then into nitrates. Two samples of saliva which I had tested for both enzymes and nitrites for four successive days gave evidence of a definite relationship between the two substances.

The inferences which have been drawn by the speaker seem to me legitimate, provided decay of the teeth, erosion and pyorrhea are practically all due to the same causes. Unless I am misinformed, however, they are not, unless it is the very general cause of malnutrition. If they are due to different ones, we possibly have a right to draw a line between the second and third columns in the first table, and consider the cases where decay and immunity from decay existed as a class by themselves, and not compare those cases with the cases of erosion and pyorrhea. It is certain that at least some cases of erosion are not due to bacteria, nor to the products of bacterial growth.

Pyorrhea, I believe, is not always due to any particular cause, local or otherwise. We notice from the tests here given that the sulpho-cyanates are much greater in the cases of pyorrhea than in either of the other three classes. I have always been a firm believer in the theory that systemic conditions must have their influence upon local conditions—at any rate as regards the degree of resistance which any given tissue may possess. Now, if the sulphocyanate is obtained from protein metabolism, as it is, according to Gamgee, and, if the pyorrhea is occasionally dependent upon systemic conditions, may not this possible relationship be worth a continued study of the subject? My experience with urines from Pyorrhea cases, nearly all with excessive amount of uric acid, leads me to wish that the relationship between high sulphocyanates in saliva and high uric acid in the urine might be investigated.

*Dr. Gies*—It has been a great pleasure to listen to Dr. Smith's remarks and to note his approval of our efforts.

I have been especially glad to hear Dr. Smith's opinion regarding the possible relation of systemic conditions to dental caries. Most dentists seem to think that the decay of teeth is purely a local matter, but I cannot believe they are right in wholly excluding systemic influences.

Dr. Smith's suggestion regarding the production of sulphocyanate in pyorrhea accords with our idea of the metabolic significance of that substance. We do not lay stress on the sulphocyanate figure for the specimens in the pyorrhea cases, because it is practically the same as that for the specimens from the cases of decay among the medical students (second group), which in



turn is decidedly different from the sulphocyanate value for the *first* group of cases of decay.

I have not intended to suggest that the various dental disease processes are identical, for we know they are not. But each type of cases failed to show peculiar or definite correlations between salivary composition and dental condition—in that negative sense sameness throughout was noted. The comparative tabulations of average data for typical kinds of dental disease were expected to show merely that the specified analyses of the selected specimens of saliva failed to yield significant quantitative data in any particular. Our *quantitative* data do not exhibit any particular substance as the cause, inhibitor, representative or accompaniment of dental decay. Our conclusions regarding the possible influences of mucin and microorganisms have arisen from general considerations that were prompted by our *negative* analytic data.

I am glad to receive Dr. Smith's suggestions regarding studies of systemic correlations, and shall be specially interested in looking up the possible connections between uric acid and sulphocyanate excretions to which he has referred.

*Dr. H. L. Wheeler*—I have a letter from Dr. Samuel Hopkins, of Boston, written in response to an invitation to come and participate in this discussion, which I will read.

Dr. Wheeler read the letter.

I have been looking over a paper written by Dr. Michaels, of Paris, and presented in French at the International Congress in St. Louis. I have had it translated, and it has taken all winter to do it. It contains so much that I believe I will not attempt to tell what he says this evening. Dr. Michaels told me last summer that the idea that the sulphocyanates had any connection whatever with tooth decay, except as an indication, was no idea of his—that he had never suggested it and had no sympathy with the idea.

*Dr. Henry C. Ferris*—We owe a great deal to Dr. Gies for his careful consideration of this subject. I wish to make but few remarks. First of these is to express my surprise and regret at the Doctor's conclusion in reference to the value of the quantitative analysis.

The Doctor's method for quantitative value of mucin seems to me to present points for error, as the different colors of the

specimens would produce a different opacity for comparison. My method for quantitating globulin, mucin and albumin is by centrifuge scale after each precipitation, which I believe to be more accurate.

I have found a patient who seems to be a normal man in all his physiological reactions. He is thirty years of age, six feet tall, normal occlusion, all teeth present, no caries, never been sick, uses neither alcohol nor tobacco, and is very regular in his habits. He shows normal faeces and urinary analysis, with exception of slight trace of indican. His blood stood 95% haemoglobin. The examination of this specimen for mucin, four drops of acetic acid in 10 c c of specimen coagulated a quantity which floated on the surface in a ball like the white of an egg. He lives largely upon a meat diet.

My findings upon this point seem to prove that normal specimens stand the highest in their mucin values, with some few exceptions.

The essayist did not mention the relation between sulphyocyanate and ammonias which has been proven to exist. If you take the case in a pathological state and correct the lesions there is a decided variation in the specimens between the sulphocyanate and ammonia. I hope that the Doctor will be able to give us some report on this subject, and not give up his biological work.

There is another relation which exists between the quantity of urea and the chlorine similar to the vital dynamism of the urin. The vital dynamism as shown in the urin produces almost the same percentages in the saliva. It only varies .01 or .02 in the cases which I have examined.

*Dr. Gies*—I am sorry that we are not in accord with Dr. Ferris on the question of methods of quantitative analysis. We have candidly called your attention to the defects of the methods employed for the quantitative determination of mucin. The defects to which we have alluded did not, we are certain, impair the validity of our conclusions. We are familiar with the method which Dr. Ferris mentioned, and would have used it if we had thought there could be any advantage in doing so.

The single case to which Dr. Ferris referred was not peculiar. There are many such instances. A "slight trace" of indican is *normally* present in urine. If the patient subsists largely on a

meat diet it is probable that his urine usually contains much more than a "slight trace" of indican. The saliva in immunity cases may be very thin. Many observations on these points are necessary to support general positive conclusions.

We have not yet taken up the study of systemic relationships, but will profit from Dr. Ferris' suggestion in that regard.

*Dr. Lothrop*—I think I have nothing to add to what has already been said. I might speak of a case analagous to the one Dr. Ferris mentioned—of a man in our laboratory who was pronounced free from dental caries, whose saliva was so thick that it was almost impossible to do anything with it.

*Dr. S. H. MacNaughton*—According to Foster's Physiology, "the reaction of the first few drops of saliva obtained by introducing a canula into the Stenonian duct is always acid." May not this explain that strong acidity of first samples of morning saliva. Are Dr. Smith and Prof. Gies in accord perfectly in the view that the teeth, especially the enamel, are affected by the condition of the system? We dentists have a different idea of that. We think that decay begins at the surface or in the crevices. Never in dentine unless exposed in some way to fluids of mouth.

*Dr. Smith*—The question of just how the systemic condition manifests itself I doubt whether I can answer.

*Dr. MacNaughton*—I mean that the enamel has a resistance different at one time than another.

*Dr. Smith*—The enamel does not lend itself to change so much as the other parts of the tooth structure; but in regard to the tooth as a whole, my idea was that if the condition of the blood is perfect, it resists the action of local bacteria—if the system as a whole is what it should be. That is a general statement. The specific application I cannot say.

*Dr. Gies*—I presume it would be hard to show that enamel once deposited is modified directly by systemic conditions that prevail afterward, yet more astonishing things than that have been demonstrated. I feel that this possibility should not be dismissed. It should be investigated further.

I know of cases in which the first few drops of saliva, collected by the method Dr. MacNaughton has mentioned, was alkaline to methyl orange but acid to phenolphthalein. I have myself put little glass tubes into the duct, in a willing subject,

and received saliva that was alkaline to litmus and acid to phenolphthalein. I have not done that in a patient just after his awakening from a night's sleep, but shall do so at an early opportunity. I do not believe that the early morning acidity to which I referred can be explained as Dr. MacNaughton suggests. The observed acidity was too strong to be accounted for in that way.

*The President*—We have all been very much interested in this address of Dr. Gies, and the discussion by Professor Smith, of Harvard Dental School, and I am sure we will profit by what we have heard to-night. I would call attention to one or two little points. In the matter of consistence, and its relation to decay or erosion, Dr. Gies spoke of decay and erosion as if they might be similar processes. I wanted to call his attention especially to the fact that in erosion the teeth are clean. The mouth in which erosion is progressing actively is generally a clean mouth, in which bacterial plaques are seldom adherent to the teeth, and the eroding surfaces are clean and highly polished. The mouth in which decay is progressing is distinctly different, in that the teeth are covered with bacterial plaques.

In regard to systemic influence being the cause of decay, I am sure Dr. Gies did not gather any of the ideas he attributes to dentists from my conversations with him on that point, because my conviction is, and has been, that decay is not fundamentally a local disease. No observing dentist can go far in his experience without recalling cases of neurasthenia. This presents one manifestation of the influence of systemic conditions. Almost every case, either in childhood, or in youth, or in adult life, presents a picture of rapidly advancing decay of teeth. Then we have, too, in advancing age senile decay, probably due to similar general conditions, which influence the character of oral secretions.

*Dr. Gies*—Dr. Howe was good enough to tell me, early in our conferences, about the essential points regarding erosion to which he has just now referred, and I should have been careful to show that I have not forgotten them. As I stated in my response to a remark by Dr. Smith, the various disease processes have been loosely considered in my remarks, merely because no chemical point of departure appeared in our results.



The conditions are alike in the fact that they imparted no detectable *differential* chemical quality to the selected specimens of saliva, either by addition or subtraction, along any of the lines of our examinations. Analyses in different directions might reveal characteristic differences, of course.

Dr. Howe is correct in saying that he is not responsible for the remark I made to the effect that most dentists regard caries as a purely local matter. Dr. Howe's opinion on this subject, which he has just stated so emphatically, is, I believe, an eminently reasonable view of the whole matter.

*Adjournment.*

## PROGRESS IN DENTAL SKIAGRAPHY.\*

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BY HERBERT MCINTOSH, A. M., M. D., BOSTON, MASS.

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The first reference to the X-Ray in dental literature in America is found in the June number of the *Dental Cosmos* for the year 1896, being the report of an address delivered April 24th of the same year at a special meeting of the New York Odontological Society by Dr. William J. Morton. When it is considered that the discovery of this marvellous radiation was made by Dr. Wilhelm Konrad Roentgen on November 8th, 1895, and reported to the Wurtzburg Physico-Medical Society in December of the same year, it appears remarkable that its applicability to dentistry should have been so soon disclosed. For it must be remembered that the first emotion upon the announcement of this discovery was one of skepticism. So many reports of astonishing discoveries appear in the popular prints which turn out to be *canards* that the attitude of scientific skepticism is deserving of praise rather than censure.

The phenomena of the X-Ray could, however, be repeated whenever there was a generator of sufficient tension and a tube of a sufficiently high vacuum. Among the fortunate possessors of this necessary equipment was Dr. William J. Morton, of New York City, who, like his distinguished father—the discoverer of ether anaesthesia, had the spirit of inquiry and the inclination toward experiment.

Equipped therefore with generator and a Crookes tube he proceeded to verify the experiments of Roentgen with entire success. If the Crookes tube could cast a shadow of the hands it ought to cast a shadow of the dental and periosteal structures. This surmise he found to be correct, and the report which he made in April of 1896 before the Odontological Society contains his early attempts at dental radiography, and the conclusions which he draws from these early and altogether praiseworthy experiments are expressed in these impressive and now historic words "And it may prove as the evening's work progresses that we shall find that the X-Ray possesses an unusual interest for the dental profession. Indeed, I am of the opinion

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\*Read before the Harvard Odontological Society, April 21, 1910.

that it may prove of equal, if not greater interest to the dental than to the general surgeon."

In this conclusion I am very strongly of the opinion that Dr. Morton is right. I believe that the X-Ray has a greater interest for the dental than for the general surgeon. Yet it must be admitted that in the recognition of its importance as an instrument of diagnosis the dental surgeon has been less prompt than the general surgeon.

In a paper read last June before the *Massachusetts Dental Society* I enumerated about thirty conditions which the X-Ray can disclose for the better information of the dental surgeon. This is by no means a complete list, though as a beginning it will serve a useful purpose. Among these I noted the position of unerupted teeth, the presence or absence of teeth in the alveolus, the position of an impacted third molar, the determination of whether teeth are permanent or deciduous, conditions about the roots of implanted or replanted teeth, the existence and extent of abscesses, the presence of instruments or portions of instruments in the root canals, or beyond the apical foramen, the presence of broaches in the root canals, the presence of roots left in the alveolar process, fractures of roots resulting from falls or violence, the presence of supernumerary teeth, the determination of the suitability of a tooth to support a bridge, the determination by the introduction of a broach as to whether a root canal has been completely filled, to show whether fillings encroach upon the pulp cavity, the presence of pulp stones, exostoses of the roots of teeth, necrosis of alveolar and bony tissue, fractures of the maxillas, dentigerous cysts, odontomata and localized deposits upon the teeth, the differentiation between pyorrhea alveolaris and conditions which simulate it, reflex lesions—as neuralgia from impactions, necrosis, pulp stones, abscesses, cysts, foreign bodies, or other irritants, and finally the relation of roots to the floor of the maxillary antrum.

This is an imperfect enumeration of what the X-Ray can do for the dentist, yet it would scarcely be possible to tabulate so long and useful a list of disclosures in general surgery.

Since the first report on dental skiagraphy made by Dr. Morton there has been vast progress in the art of radiography, for it must be remembered that Roentgen made his discovery by means

of a Crookes tube. This is an egg-shaped tube supported upon a stand and having a wire carried into the interior with an expanded terminus. The X-Rays were produced by the impact of the kathode stream upon the walls of the tube. The great defect of this was the lack of focussing and consequent loss of definition in the picture.

Roentgen describes the circumstances under which he made his discovery as follows: "I was working with a Crookes tube covered by a shield or screen of black cardboard. A tube of barium platino-cyanide paper lay near by on the table. I had been passing a current through the tube and noticed a peculiar black line across the paper. As this effect could be produced by the passage of light only, and as no light except from the tube could have struck the plate, I made a test at once, and found that some kind of rays actually passed through the black cardboard cover. In a completely darkened room the paper screen, washed one side with barium platino-cyanide, lighted up brilliantly and fluoresced equally well no matter which of its sides was turned towards the tube. This fluorescence was noticeable even at a distance of two meters. The most remarkable thing to me was that this fluorescence passed through the black cardboard cover, which transmits none of the ultra violet rays of the sun or of the electric arc. I found by experiment that all bodies are transparent to this influence." Compare with this primitive tube, of which I will later show a picture, the magnificent tubes employed at the present time. In order to secure proper focussing and an adequate X-Ray production a target faced with platinum was early introduced into the tube upon which the kathode stream could focus.

This improvement was first suggested by Professor Herbert Jackson,—an Englishman,—so that the improved tube is sometimes called the Jackson tube. It is also called the focus tube, since the kathode stream is accurately focussed from the concave surface of the kathode upon the surface of the target.

I have made a careful review of the literature of dental skiagraphy in America from its origin with the historic address of Dr. William J. Morton, to which I have already referred, to the present time. In Vol. XXXVIII (1896) of the *Dental Cosmos* occurs only one other allusion to the X-Ray. In 1897 there are



ten references. Among these I found the following statement from Dr. Van Wert (N. Y. Odontological Society): "Most of the cases I undertook required from eight to fifteen minutes exposure to get satisfactory results." (March 16, 1897). Contrast this with the speed of modern dental skiagraphy. Though I purposely use a low tube in order to get detail, my best skiagraphs are taken in from five to ten seconds or less, and of course, if desired, they could be taken in much less time.

In this volume Dr. G. Lenox Curtis, of New York (American Medical Association, section in Dental and Oral Surgery), says: "One trouble with the X-Rays was the expensiveness of the apparatus. He thought it would be well if dental societies would own such apparatus and place them at the disposal of the profession." This suggestion made thirteen years ago has not met with approval because the occasional use of an apparatus for the production of X-Rays does not conduce to the acquisition of skill upon the part of the operator. Success here, as elsewhere, comes from constant study and practice, and the dental surgeon who uses an apparatus occasionally is not likely to acquire a satisfactory degree of skill.

Through this volume frequently occur expressions of fear in regard to the danger of producing X-Ray burns, and indeed a fear might justly be entertained of the possibility of untoward results where exposure lasted from fifteen to thirty minutes. It is probable that in that early day many were deterred from entering into the field of dental skiagraphy through the exaggerated reports of X-Ray dermatitis. Even to-day one must always bear in mind the possibility of doing harm where the exposures are not made under proper safeguards. Undoubtedly, however, there was an exaggerated fear at this period, and Dr. A. E. Baldwin, of Chicago, says that he had a peculiar feeling in his hand for several days after an exposure of only a few seconds. This was undoubtedly a psychological effect.

In Vol. XL of the *Dental Cosmos* (1898) there is not a single reference to the X-Ray.

In 1899 Dr. C. Edmund Kells, one of the earliest students of dental skiagraphy, has an instructive paper. Illustrating the great length of time then employed in taking skiagraphs, he says: "I myself was present when one of the early operators took a skia-

graph of a hand in twenty minutes, which was not an unusually long exposure at that time."

A curious statement occurs on page 640 of the *Dental Cosmos* for 1904, made by Francis LeRoy Saterlee: "It is obvious, therefore, when I tell you that no case of a burn has ever been reported that has been caused by an exposure of less than thirty minutes." While it may be true that no burn was ever reported up to that time that was caused by an exposure of less than thirty minutes, it is obviously misleading to give the impression that time is the most important ingredient in the production of a burn. I was present where a case of dermatitis was produced after an exposure of forty-five seconds. In order to determine the erythema dose of an X-Ray tube it is necessary to know four things: (a) hardness of tube, (b) quantity of current passing through the tube, (c) distance of tube from patient, and (d) time of exposure. These data can be readily obtained and are all under the control of the operator. By hardness is meant the velocity of the kathode stream in the tube, and this can be measured by a radiochromometer or penetrometer. The quantity of current passing through the tube is measured by a milliamperemeter. Distance of the tube from the patient and time of exposure are evidently entirely under the operator's control. Dr. Walter, of Hamburg, has prepared tables showing the number of milliampere minutes required to produce an erythema with tubes of varying hardness. He directs attention to two other factors not under the control of the operator which influence the output of an X-Ray tube. These are (a) the thickness of the glass, and (b) the character of the metal covering the target. These should be marked on each tube sold by the manufacturer, that proper allowance may be made by the operator.

Thus at a distance of 10 centimeters, and a thickness of glass of .4 millimeter and a penetration of 5 B. W. on the Benoist-Walter scale the erythema dose would be 3.8 milliampere minutes. This means that an exposure of the patient to a current of one milliampere in the focus tube with a hardness indicated by 5 on the Benoist-Walter scale at a distance of 10 centimeters for 3.8 minutes would produce an erythema, or a current of 3.8 milliamperes for one minute under the same circumstances would constitute an erythema dose. It thus appears how misleading it is to

consider only the element of time in determining the probability of burning a patient.

In the illustration just given the tube is much too near, the usual distance being 25 centimeters, the penetration is much too great for dental skiagraphy, since a soft tube is required to bring out detail and the time much in excess of what is needed in coils capable of furnishing a sufficient quantity of current. The danger of burns, therefore, in dental skiagraphy should be absolutely eliminated. When, however, any necessity for precaution exists as in cases of suspected idiosyncrasy filters of leather, aluminum or glass may be used, which serve to absorb the softer and more irritating rays.

The fluoroscope was early introduced into X-Ray work, and was an invention of an Italian by the name of Prof. E. Salvoni. He called it the cryptoscope. Dr. Rollins, of Boston, is said to have first suggested its use in dentistry, and Dr. Tousey, of New York, has endeavored to popularize it. It does not, in the judgment of the writer, have much value. It must be used in a darkened room, or under the protection of a dark cloth, and in any case exposes the operator to the danger of damage from frequent X-Ray exposure. The films in general use serve every useful purpose. Originally the operator made his films, cutting them out of a Kodak roll, and adapting them to the size of the area radiographed. Later, after much experimentation, the manufacturers put on the market a stock film  $1\frac{1}{4}$  by  $1\frac{5}{8}$  inches in size, wrapped in black paper to exclude the light. They are made of stiff celluloid and have a triple emulsion. These are very serviceable. It is still useful, however, to prepare special films for special uses, as where the condition of the periosteal tissues is to be studied rather than an individual tooth.

It was early discovered that pictures of the whole face could be taken upon photographic plates. Here it becomes necessary to place the plate external to the tooth. There is thus obtained a shadow of varying densities, of the maxillary and frontal sinuses with the superimposed shadows of the teeth. This method has occasional advantage where the relation of the upper molars to the floor of the maxillary antrum is to be determined, or where the presence of pus in the same area is suspected.

Ten years after Dr. Morton's historic report to the New York

Odontological Society upon the great promise of service which the X-Ray offered to dentists, I find the following declaration in a paper read by Dr. H. I. Schamberg before the Pennsylvania State Dental Society, at its 38th annual meeting and reported in the *Dental Cosmos*, Vol. XLVIII (1906): "There is no specialty in which the X-Ray has such a wide field of usefulness as in dentistry, and it is my belief that not many years will pass before nearly every case that comes to the dentist for root canal treatment will at some stage of the procedure require an X-Ray picture in order to determine definitely whether or not the work in that canal is perfect. So much has been written about the value of the X-Ray as a diagnostic aid both to dentistry and medicine that it is scarcely necessary for me at this time to mention the various phases of dental work in which it is helpful. I believe the most pleasant part of my work during the past five years has been in connection with the X-Ray as an accurate means of diagnosis. Many cases of facial neuralgia which have in the past met an untimely death from the failure to locate the cause of this terrible affliction might have been detected had the patient had recourse to the X-Ray." Thus Dr. Morton's forecast finds an ample fulfillment in the wide experience of this practitioner.

Two points to which Dr. Schamberg directs attention in this paragraph deserve a moment's consideration.

The X-Ray has performed no greater service to dentistry than in revealing with unerring certainty the cause of the vast majority of alveolar abscesses. This is imperfect root canal fillings.

Says Dr. M. L. Rhein in a lecture before the New Jersey State Dental Society, July, 1908: "There is absolutely no assurance of a tooth remaining healthy unless you reach the end of the canal. It matters very little how beautiful your superstructure may be, if your foundation is defective. And it means more to us than the building upon a weak foundation, if we leave in the mouths of our patients the opportunity for infection."

He therefore urges upon dentists the importance of introducing a broach into the root canal for the purpose of diagnosis, and taking a skiagraph of the instrument and tooth. This enables the dentist to clear up all doubt as to whether there has been complete removal of the pulp preparatory to filling. It can be safely



affirmed that if an X-Ray picture were taken in all cases of doubt as to whether the pulp had been entirely removed, and the root fillings carried to the apical foramen, the number of alveolar and antral abscesses would be vastly reduced

The second point in Dr Schamberg's address which I desire to emphasize is the light which the X-Ray affords in cases of facial neuralgia. It has happened in my experience to take a dental skiagraph in a case where three live pulps had been removed to relieve a facial neuralgia. The skiagraph revealed the presence of an impacted third molar, the removal of which immediately cured the neuralgia. Facial neuralgia may arise from tumors, cysts, caries of bone or alveolar tissue, from impaction, from pulp stones and foreign bodies. And each of these conditions is readily discoverable by the X-Ray. Is it not well, then, to resort to this simple method of diagnosis rather than to work unintelligently in the dark?

The first reference to stereoscopic pictures of the teeth which I have been able to find in dental literature is found in Vol. 48 (1906) of the *Dental Cosmos* in an article by Dr. Tousey, of New York. He says: "The tube is shifted about three inches to one side after making the first picture, and care is taken not to move the patient's head and to place the second film or plate in exactly the same position occupied by the first. For the radiograph of the whole face a stereoscopic plate holder is a necessity. The first plate may be withdrawn and the second slipped into it while the patient's head still rests upon the upper surface of the plate holder. Two pictures made in this way may be looked at with a small stereoscope held in the hand, and the two prismatic lenses make the picture look like one, with the perspective showing the different parts in relief. Such a picture is especially useful where the question arises as to whether an unerupted tooth lies toward the lingual or buccal aspect of the jaw."

Caldwell has recently invented an apparatus in which, by the pressure of a bulb, the second film is slipped into position in the mouth and the X-Ray tube placed in proper relation for the second exposure. Whatever advantages may be possessed by stereoscopic skiagraph are likely to be easily obtained by this apparatus.

We soon begin to discover in reviewing the literature of dental skiagraphy references to the therapeutic properties of the

X-Ray, and on page 1226 of Vol. XLIV of the *Dental Cosmos* (1902) you will find Dr. Morton expressing his opinion that the disappearance of an abscess after an X-Ray exposure for diagnostic purposes was due to the therapeutic property of the X-Ray. I recall a case of subacromialis bursitis which I had been treating for a number of weeks which disappeared after one exposure to the X-Ray, to ascertain whether there was a possible tubercular process in the joint.

These observations of Dr. Morton and others soon led to attempts to control pain and inflammation, and especially pyorrhea alveolaris, by means of the X-Ray. In so intractable a disease any treatment which promises a measure of success should be welcomed, and the volume of testimony as to the utility of this method of treatment is growing. Thus Dr. Tousey, in *Items of Interest* (1905), page 814, says: "The results in pyorrhea are almost instant relief of pain and prompt improvement in the condition of the gums. The X-Ray and high frequency currents will cure most cases of pyorrhea, and Dr. Schamberg in *Items of Interest* (1906), page 940, found that where teeth were exposed to the X-Ray in pyorrhea pus ceased to flow, but where in the same case teeth similarly affected were screened from the X-Ray for the purpose of experiment the pyorrhea continued.

The X-Ray has undoubtedly a degree of control over the production of pus. This is true of tubercular abscesses which show notable improvement under X-Ray treatment. While the effect is not bactericidal, it apparently renders tissues less favorable to bacterial growth. The effect is rather upon nutrient media than upon the bacteria themselves. It is not at all improbable, and there is a growing mass of evidence to show, that the X-Ray acts in a manner similar to vaccines. These achieve their result by stimulating the production of the protecting or immunizing substances of the blood, and the researches of Dr. Crane, of Michigan, and Dr. McCullough, of London, show that after each X-Ray exposure there is a positive phase similar to that which follows the injection of a vaccine into the system. The X-Ray has, however, an advantage over the injection of vaccines in that the defensive material elaborated by the former is autogenous, and, therefore, of the same strain as the bacteria causing the disease. The treatment of pyorrhea alveolaris is necessarily tedious, but it

is probable that no method has yet been elaborated that promises more for the patient than the X-Ray combined with the high frequency vacuum electrode.

While the X-Ray is unquestionably more useful for the dentist than the general surgeon, it is still true that dentists have been slower in utilizing the great service which this wonderful discovery is capable of yielding than their colleagues in general surgery. There are, however, strong indications that this condition will not long continue. There is a marked and growing interest among dentists in X-Ray diagnosis, and the satisfaction which they evince when an obscure condition is cleared up by the employment of the X-Ray is gratifying and encouraging. I shall now throw upon the screen a series of pictures revealing most of the conditions in which dental skiagraphy is of service to the dentist, and accompany them with such comment as may seem necessary.

(Dr. McIntosh then threw about seventy-five pictures upon the screen illustrating points referred to in the preceding paper.)

## A "BACTERIOLOGICAL INVESTIGATION OF SCHOOL CHILDREN'S TEETH."\*

BY GEORGE M. COOK, M. D., CHICAGO, ILL.

The question of school children's teeth is a subject that has created considerable discussion in the last few years. The decay of the teeth really means something to the race, as a whole. It has been variously estimated that from eighty to ninety per cent. of all children have decayed teeth.

One of the greatest needs of the human family and the one thing that all should strive for is that practical search after the fitting and agreeable adaptation of the external condition to the greatest efficiency, to protect and build up a strong, healthy individual.

In our present civilization, we know that the irritability of the individual is becoming greater and that external irritation is more pronounced, at the present time, than ever before in the history of mankind, so in childhood and during adolescence. The individual is the product of his environment, then we necessarily will say that decay of the teeth is one of the processes than can, and in most cases, does bring about a great amount of irritability and has a great influence on the individual.

A decayed tooth, probably more than any one thing, may bring about and does at times produce one of the greatest sources of influence on the general vitality of the individual. Any factor that produces any amount of irritation interferes with digestion and this influences the metabolism of the body in such a way, as to make a lasting impression on the health and happiness of the future man or woman.

We need not discuss at this time, the cause or the factors that enter into decay of teeth, since it is pretty generally recognized that bacteria are one of the principal factors in the causation of tooth decay, but this is not all of the deleterious influences that bacteria may have on the individual. Since bacteria produce fermentation, putrefaction and disease, we have more generally recognized the so-called pathogenic organisms, as the only influence that might be produced by them on the human

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race, but if we study individually, those organisms in the mouth, that does not appear to produce any deleterious specific disease, still those that produce fermentation will of necessity produce their influence on the efficiency of the body to take care of its carbohydrate metabolism. Carbohydrate digestion, in the young and early adult life, is one of the most influential factors in the body energy, and unless this process is carried on with perfect equilibrium, sufficient energy cannot be transferred to the body to produce the highest efficiency of growth and development.

In the bacteriological study of children ranging from a few months old to sixteen years of age indicates that bacteria are abundantly present in the mouths of all persons from early babyhood to later in life and that a large majority of these bacteria belong to that class that we usually designate as fermentative organisms.

The mouths of some of these individuals were examined to find that in the very unclean mouths a variety of bacteria existed there, ranging from three to fifteen different species and that the majority of these could break up starchy materials much faster and with more destructive influence than could the ferments of the salivary secretions.

In our investigations we found on culture plates that those cultures that only had three colonies appear we classed as clean mouths; those that went above three colonies on a plate and less than eight we classed as partially clean mouths. Those that went above the eight colonies we classed as mouths capable of doing great harm to the individual, from a viewpoint of general infection as well as from the point of view that considerable digestive inefficiency would be a constant menace to the health of the individual, while there was that danger of the presence of pathogenic organism that would from this source find their entrance into the digestive tract as well as into the circulation of the body as a whole.

Out of two hundred and twenty mouths, we found 14.6 per cent. who had what we classed as clean mouths; those who had partially clean mouths were seven-tenths of one per cent., showing that most all who had unclean mouths belong to the larger class of those who were in constant danger of a general infection

and all of whom had decayed teeth. The majority of organisms isolated from the latter classes and injected into susceptible animals gave rise to more or less disturbances of some character or other. Most of them produced acute inflammatory conditions, following later on with a general septic process. The class of bacteria that were isolated from decayed teeth produce fermentation with the formation of either aldehydes, alcohols or acids, as well as being capable of producing certain inflammatory processes in the animal body. Those that were isolated and grown on one and a half or two per cent. of grape sugar added to the culture media produced acids to about one per cent. In fact, it would seem that all bacteria isolated from the mouth and grown on grape sugar culture media had a strong tendency to form acids. These findings seem to show that decay of the teeth corresponded with the acid producing effect of all organisms isolated from the mouths of those who had decayed teeth. Other studies from the mouths of persons from twenty-five to fifty years of age showed that where there was not decay of the teeth there was a mucoid degeneration of the epithelium, especially at the gingival line of the mucous membrane.

In childhood, as well as later in life, we observed that individuals having a larger number of bacteria in the mouth had faulty metabolism of more or less extent. It was then thought that examination of the contents of the intestinal canal should be made, which was done to some extent, and it was found that the bacteriological finding compared very closely with that of the mouths of those examined. Not so many of those found in the intestinal tract were fermentative as those in the mouth. This was especially true in the adult persons examined.

This question came up, "Do the same bacteria found in the mouths of children correspond in their fermentative powers and virulence?" This was tried out in rather hasty manner to find that the ordinary pus producing bacteria in the mouths of the young was unquestionably the better prepared to produce disturbances when inoculated in animals.

All the observations tend to show that the bacteria found in the mouths of children was, as a rule, more pathogenic than in the mouths of those who had passed their twenty-first year. The chains of the streptococcus were much longer as a rule in the

mouths of children than in those of individuals who had passed their twenty-fifth year.

In the mouths of children, the streptococcus was found to be present in 33 per cent. while in the adults they were found to be present only in about 8 per cent.

The full significance of the foregoing facts is that, that the mouths of children give a better environment for bacterial growth than the mouths of persons of more advanced years. After the individual passes her twenty-fifth year, there is a more or less tendency to mucoid degeneration of the epithelium, especially is this true, in those persons, whose metabolism has not been of the very best, and this is especially true if there has been a disturbance with carbohydrate digestion in early life. Under such circumstances, the fermentative processes tend to lessen after the twenty-fifth year of life, and if there is abundance of bacteria in the mouth, there is a more or less general tendency to mucoid degeneration instead of decaying of the teeth, unless the conditions are in such a way, as to produce acids. Unless the mouths of certain persons are kept very clean, decay of the teeth may continue until old age has been reached. Those persons as a rule, will have but very little disturbance of the gums, especially is this true, if they are in general good health.

The bacteriological findings in the mouths of children, tend to show that from very early life, up to about the twenty-fifth year is the period at which fermentation is more marked than any other period, except possibly when the vitality has been reduced by some general illness, like typhoid fever, or some other constitutional illness, which will under ordinary circumstances, reduce the metabolism of the body, to a very low state and then many times this will manifest itself in the mouth, in some other way than that of decay of the teeth, such, for instance as pyorrhea alveolaris. The ordinary pus producing organisms like streptococcus pyogenic, will we know, cause certain septic conditions in the body, such as endocarditis or puerperal septicemia and many other conditions which are ordinarily looked upon as general infections.

The organisms, like the streptococcus and many other forms, may find their entrance into the body, through decayed teeth, especially if the teeth have decayed to the extent that the pulps are involved and unquestionably this is true since we find,

that inflammation is established around about the roots of such teeth. It is extremely easy for the circulation to take up a large number of these bacteria and distribute them to various parts of the body. We further realize, that persons suffering from such an infection, always have certain general appearances. Clinical experience demonstrates this beyond any question of doubt. The bacteriological findings, in sixteen per cent. of children suffering from an alveolar infection of this nature showed, that they had a mixed infection, from 2 to 6 different kinds of organisms, and that they suffered from the general symptoms of such infections, and in eleven cases out of 220 children examined, there was present a tubercular infection. It would be difficult to state whether or not, the tubercular infection was a primary or secondary process. The presence of the tubercular bacillus was determined by both a microscopic examination and animal inoculations. It is many times possible, that these bacteria find lodgement, in those badly, broken down and pulpless teeth, and remain there for almost an indefinite period.

The pneumo-coccus was found in the mouths of fifty-six out of 220 children examined. These findings were determined by the inoculations into animals, which showed that pneumococcus septisemia was produced in all the animals and the organisms were found in the animal body. It was also found that in a group of 100 other children not included with the 220 previously spoken of above, the pneumo-coccus was found in sixty-seven per cent. This would indicate that the pneumococcus was more frequent in the mouths in children than would appear possible, under ordinary circumstances.

I have previously called your attention to the fact, that the streptococcus is not an uncommon organism in the mouths of children and when present in company with the bacillus of pulp gangrene, they produce some of the most infectious conditions, when inoculated together, of all the organisms found in the mouths of young persons. The staphylococcus is more common in the mouths of children than the streptococcus and its inoculation with the bacillus of pulp gangrene always produces an infectious condition that is of no small importance. It was also found that in the last group of children, independent of the two hundred and twenty, the pneumo-coccus was found in sixty-seven per



cent. From these findings, it would appear that a large class of children have the organism that produces pneumonia in their mouths. The peculiar and interesting facts might be commented upon by saying that the disease, pneumonia, ought to be more prevalent in childhood than is usually found to be the case, but of course, pathogenic organisms may be quite frequent in the mouths of persons who never contract the disease. This is certainly true in the case of pneumo-coccus, as well as many other infectious diseases.

A remarkable condition may exist also, with a special reference to many forms of local lesions of the mucous membrane of the mouth, nose and throat. We know that many forms of stomatitis which are purely and simply a local lesion produced by certain forms of micro-organic life, is brought about by the action of some forms of organisms due principally to the loss of the resistance of the mucous epithelial structure to the action of these organisms.

It is thought by many that all the requirement for an infectious disease, even of the slightest and most insignificant lesion of the mucous membrane, is for a bacterium that has been found in other lesions to come in contact with the tissues and the disease will be established, but with our present biological knowledge, we know that the physiological organization must become lowered and the resistance of the body to bacterial invasion may then permit the disease process, but without the loss of immunity and the presence in sufficient number of bacteria, no disease process can be established.

There is found to be present in the mouths of many persons a spirochaete and the bacillus found in certain lesions of the throat and mucous membranes of the mouth by Vincent, who determines their presence only in certain lesions. Unquestionably such organisms are found in the mouth, a great many times, when such lesions are not present. These particular disease processes recognized by Vincent are rarely in mouths except those which have a more or less mal-nutrition or any condition of the body that might bring about any pre-disposition to these particular lesions. The manifestation of many of the disease processes of the mouth accompanied disordered digestion and the digestive disturbances are usually given the entire credit for the presence

of these various lesions, while, as a matter of fact, they are only the predisposing factors and the bacteria is the exciting cause of the local lesions.

From the investigations that I have made in the human mouth, and especially the mouths of children, there is a strong indication that bacteria maintain their virulency in the mouths of young people more constantly than they do in the mouths of adults and from the examinations we have made on those bacteria producing fermentation that were taken from children's mouths that they form acids to a considerable extent more than those found in adults. This means disturbances of digestion, because wherever fermentation goes on in the mouth with the productions of acids, we know that acids interfere very considerably with the ferments of all digestive fluids, so it will be seen that with the formation of acids in the mouth, the ptylin of saliva will fail to act upon the carbohydrates and in this way will interfere with the digestion of starch. The digestive interferences will sooner or later bring about disturbances of the metabolism of the body and in this way, lower the resistance of the body, so that it will be almost impossible to prevent the formation of various lesions in the mouth, such for instance as various forms of stomatitis or gingivitis or possibly decay of the teeth.

In many instances, if this condition existed for any length of time there might be disturbances of the gingival epithelium and especially would this be true in the interproximal spaces and almost before one would recognize the condition, a permanent tendency might be established towards pyorrhea alveolaris that might continue till later in life, when the disease would have fully established itself as a permanent lesion.

The facts that had been brought about in these investigations would tend to show that the mouths of children ranging anywhere from early babyhood to sixteen years of age bacteria find more nearly their natural habitat in the mouth than at any other period of life and that their presence there is more harmful than would possibly be the case in middle or adult life. Of course, we do not wish to infer that any of these bacteria or their disease processes may not exist at any period of the individual life, but the mere common digestive disturbances are brought about

through the actions of bacteria in early life and have a general permanent effect upon the individual in later life.

So any discussion of oral hygiene or anything that may interest the public mind in the care of children's teeth and mouth from a bacteriological point of view can never go amiss for we know now that bacteria are one of the most important factors in the causation of tooth decay and various other lesions of the body. Since we know these facts and we also know that the mouth is the principal gateway, through which all infections of a local or general nature may pass, we can not fail to be more firm in the belief that if the mouth is kept clean and in a most nearly sanitary condition, we will certainly lessen the possibilities of infectious diseases of a general and local nature, therefore, I can only say that the various bacteria should, under all circumstances be reduced to the minimum, as to number and kind in the human mouth.

I hope that I have added something to the knowledge of bacteriology in the human mouth and that I may be the means of stimulating your society to further discussion and investigation.

DR. H. C. EMERSON, M. D., SPRINGFIELD.

I have been highly interested in the valuable paper which has just been presented, and I wish to call your further attention to some facts in connection with the presence of bacteria in the mouth, particularly in children of school age.

We are beginning to realize more fully that the mouth is the chief channel of infection in most of the acute diseases. The tonsil has come to be recognized as one of the chief sources of infection and I have no doubt that many infections are brought about through diseased processes of the teeth which allow bacteria to be taken into the system in this way.

It is undoubtedly true, as Dr. Cook has pointed out, that the mouths of children contain many more bacteria than do those of adults, due in part to the lack of care of the teeth and mouth practiced by children, and in part to the universal habit of children putting all sorts of things into the mouth, not the least of which are dirty fingers.

With regard to disease producing germs, my experience leads

me to think that the pus producing organisms, namely the streptococcus and staphylococcus aureus and the pneumococcus, are not commonly found in mouths unless there is some pathological process going on. It is true that the pneumococcus is found somewhat frequently in normal mouths where there is no inflammation. This organism causes pneumonia, as you know, and many less severe processes like severe colds, bronchitis, pleurisy and diseases of the middle ear. It remains in the mouths of persons having had pneumonia for a long time, weeks and months.

Diphtheria germs are not infrequently found in the mouths of healthy persons, and on this point we have some accurate information. In 1902 the Massachusetts Association of Boards of Health carried out an investigation to determine whether or not diphtheria bacilli were found in the mouths of well persons, particularly those who so far as known had not been recently exposed to diphtheria. Three thousand nine hundred and fifty-three such persons were examined by means of swabs taken from noses and throats in Boston, Brookline, Lowell, Newton, Waltham and Springfield, Massachusetts,—Minnesota, New York City, Washington, Ontario, Canada and the Willard State Hospital.

Certain forms of diphtheria bacilli were recognized and agreed to as the standards among those carrying on this investigation. When the results were tabulated it was found that a little over 1% of all the persons examined showed diphtheria bacilli in their mouths, and, generally speaking, this percentage held good for the various localities in which the work was carried on. This work has been recently corroborated in Boston when in last September, the mouths of all the children attending school in the Brighton District were examined for diphtheria germs and of over 4,000 children thus tested a little over 1% showed the presence of diphtheria bacilli.

It is to be noted, however, that these diphtheria germs caused no symptoms in the children in whom they were found, and they produced no symptoms when injected into guinea pigs, thus showing that while a small percentage of persons may harbor diphtheria bacilli in their mouths without symptoms, these organisms have a very slight virulence.



The streptococcus while not the real cause of scarlet fever is very closely associated with it, and is invariably found in the mouths of scarlet fever patients. Although these common disease producing germs are usually not present in the mouth except when some inflammatory process is going on, we have recently had our attention called to a very dangerous class of persons, namely the so-called "carriers." These carriers are persons who with little or no symptoms carry in their bodies disease germs, like the diphtheria bacilli for instance, and are thus an unknown source of infection. There is no question but that many epidemics among school children are kept alive by these carriers.

You have all probably noted the very great increase in the number of cases of infantile paralysis during the last few years. Although the cause of this disease is entirely unknown and has never been isolated, it has been demonstrated that the infection reaches the system usually by means of the naso-pharynx and that there are many persons serving as carriers of the infection, although they themselves do not have the disease.

It is needless for me to call your attention to the frequency of poor teeth in children. I read from the 1909 Board of Health report of this city that during the year just passed 6,116 children in the public schools were found with defective teeth and letters were sent to the parents stating the fact. Our school population is about 13,000, and the number of pupils found with poor teeth is probably much lower than the real number.

The mouths of children contain many other bacteria in addition to those capable of producing disease and they no doubt contribute greatly to teeth decay and tend to lower the resistance of the body. I am inclined to think that many cases of disease and even epidemics might be prevented and the general health of children greatly improved if they would take proper care of their teeth.

It is certainly astounding when we realize the dangers which accompany unclean mouths and it is not only your opportunity but your duty to not only teach the children coming under your charge the proper care of the mouth, but to advise and educate the parents so that their children may grow up with clean mouths and sound teeth, protect themselves from infection and not be a source of danger to others.

## THE VALUE OF RADIOGRAPHY TO THE DENTAL AND ORAL SURGEON—ILLUSTRATED WITH LANTERN SLIDES.\*

ALBERT L. MIDGLEY, D. M. D., PROVIDENCE, R. I.

In order to be a competent diagnostician it is necessary to have a thorough knowledge of pathology and to make use of and be familiar with the appliances and apparatus that science has produced that aid us in reaching our conclusions.

Medicine and surgery both advanced very materially with the advent of the Roentgen Ray and at the present time we recognize its worth not only as a therapeutic agent but also as an aid to diagnosis and as a guide in mapping out the course of our medical treatment and surgical technique.

Roentgen Ray therapy has its place in all branches of medicine and surgery but in dental and oral diseases its usefulness appears to be extremely limited, with the exception of epidermoid cancer and some types of indolent ulcers. A few writers claim that it has an encouraging influence in pyorrheal conditions and dento-alveolar abscesses but the degree of utility is a question to many.

It is not the purpose of this paper to enter into a discussion of its therapeutic value but rather, with radiographic lantern slides to assist us, to study its worth as a diagnostic agent and as a director in outlining our medical treatment and surgical procedure in the various diseases that we meet in the practice of dental and oral medicine and surgery.

At the outset we do not wish you to understand that a skiagraph is all that is necessary for reaching a correct diagnosis in any case but to know that we believe that the interest and welfare of our patients are best conserved by a deep study of clinical observations happily blended with the testimony given by the radiograph. In other words the use of the radiograph is to confirm, supplement and give additional information to the knowledge we have gained from a study of the history, symptoms, etc.

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\*Read before the Massachusetts Dental Society June 14th, 1910.

## ROOTS AND ABSCESES.

A radiograph assists us very materially in our examination of and conclusions upon the condition of the roots and crowns of teeth. Among other things it shows whether or not teeth have passed the stage of mechanical and medicinal remedial agencies and argues for or against extraction. It exposes very clearly imperfect root and crown fillings, ill-fitting crowns, abscess and pyorrheal sacs, foreign bodies and roots covered by the mucous membrane. It also informs us of the amount of absorption that may be taking place after replantation; presents to view the advance of pyorrheal absorption and also curvature and location of roots, all of which is of the utmost value to the painstaking dental surgeon and suffering patient.

## MALPOSED, UNERUPTED AND SUPERNUMERARY TEETH.

Malposed, unerupted and supernumerary teeth are most intelligently studied and effectively treated with the aid of radiography because the operator has a more true and a clearer picture of the exact position of the offending tooth, its anatomical relation to other structures and its clinical pathological appearances than would be possible otherwise. For these reasons we should resort to a skiagraph both in the difficult type of cases and those that may be easily detected by the probe and visual examination and suspected because of the symptoms of ankylosis, swelling and dull throbbing characteristic pain in the masseter region.

From our study of the case just described and which is typical in a general way of many cases of malposed, unerupted and supernumerary teeth we may state that our lines of operative technique were positively and accurately determined upon beforehand and therefore destruction of tissue, possibly deformity and pain reduced to the minimum. It must also follow that there is less shock to the patient on account of the greater speed, precision and skill of the operator which the added radiographic survey alone made possible. In regard to radiographs generally, but to this class of cases particularly, we may also conclude that conditions are so unerringly portrayed that our operation is never of an exploratory character. Apropos of this discussion, we may say that even though third molars are not erupting a skiagraph puts us in a position to anticipate pathological activity by advis-

ing us as to whether we may expect a normal or abnormal eruption.

#### MAXILLARY SINUSITIS.

Maxillary sinusitis is often secondary to some disease of dental origin and cases of this kind are quite frequently relieved or cured by the removal of a tooth. Some common causes of pus in this sinus are pyorrhea, abscessed teeth, roots covered by the mucous membrane, malposed teeth and foreign bodies such as roots forced into the cavity during extraction, broken broaches, cotton dressing or other imperfect fillings, protruding through the apex of the roots through the floor of the cavity. The presence or absence of any of these irritants is beautifully shown in the radiograph.

The absolute knowledge gained with radiography in these cases enables us to more easily remove the excitant and often decides for or against opening the cavity. If it is best not to open the sinus but to rely on extraction the patient will have suffered less pain and discomfort, will have taken less chance of having had this and the accessory air sinuses infected and will not have had the physiological state of the antrum interfered with, all of which is very important. If it is necessary to open the sinus the radiograph will point out the lowest point in the cavity,—the centre for pus to accumulate, and therefore drainage will be more perfect.

#### MAXILLARY FRACTURES.

At the present time good surgery demands a radiograph before attempting to reduce any fracture for it not only confirms our diagnosis but also indicates the area, extent and lines of fracture; differentiates as to single and multiple and shows the location of fragments and spicules of bone which predispose to abscess formation, especially in the comminuted variety of cases. Then too, if radiographs are made at regular intervals during treatment we know whether union is or is not taking place with the splint in situ. The presence of a fracture in the upper half of the ramus or in or near the coronoid or condyloid processes is often difficult to diagnose especially if there is one or more fractures in other parts of the bone. This case beautifully shows how well radiography leads us from the fields of obscurity.



Even with our knowledge of occlusion, facial contour, adaption of splints, etc., it is very evident to you that supplementary radiographic information is of value to the patient in that he suffers less pain, takes less risk of deformity, enjoys a more speedy recovery and perfect result than would be the case with less competent treatment.

#### NECROSIS.

An important use of the radiograph in necrosis cases is to mark out the boundaries of the diseased tract. In very extensive cases especially it maps out our surgical technique and governs our judgment as to whether it would be feasible to wait and assist nature as she exfoliates sequestra or to perform a more radical operation.

Another class of cases where the radiograph is a great aid to the surgeon and of infinite value to the patient is necrosis in children with teeth in the process of development. It is very evident that if we have a clear understanding of the boundaries of the necrotic area and what is contained therein, we will be less apt to err in needlessly removing developing permanent teeth or other healthy tissue than would be the case with a less definite idea of conditions.

From our study of these last slides we may conclude that the use of the Roentgen Ray is imperative in all necrosis cases if we are to follow along conservative lines but that its chief value lies in extensive cases and in those occurring in young children with teeth in the process of development.

#### BENIGN AND MALIGNANT GROWTHS.

We are generally able to recognize the nature of a tumor, whether benign or malignant, from the age, history, symptoms and macro and microscopical appearances. Yet the radiograph is of some value in marking out the limits of the pathological process and in studying the case while treatment is going on.

#### VALUE IN ORTHODONTIA.

The use of the X-Ray is of value to the orthodontist in that it gives him a much deeper and clearer view of his field and thereby assists in shaping his course of treatment. Among other

things it informs him of the presence or absence of the permanent teeth and the degree of their development; shows length and direction of roots, and spaces between deciduous and permanent teeth; indicates the extent of absorption or deciduous teeth and decides for or against extraction. In other words, it gives him a more intimate knowledge of conditions not visible to the naked eye or examinable by the probe.

#### DISLOCATIONS.

Dislocations are easily diagnosed but skiagraphy is of value both before and after reduction in our examination for possible injury, i. e. fracture.

#### DIFFERENTIAL DIAGNOSIS.

Radiography occupies an important role in a differential diagnosis. For example, it is often quite difficult to differentiate between tic douloureux and hypercementosis with merely symptomatic evidence and a visual and instrumental examination. In these cases radiography easily solves the problem as it also does in a differentiation between ankylosis due to injury and infiltration of the tissues with adhesions from ankylosis caused by a malposed molar.

#### DIAGNOSIS BY EXCLUSION.

Diagnosis by exclusion or elimination is a logical method of determining the cause of an obscure, obstinate neuralgia. A radiograph, with our knowledge of objective symptoms and clinical evidence, will materially assist us in positively rejecting malposed, unerupted and supernumerary teeth, stones in the salivary glands and ducts or in the pulps or teeth, maxillary fractures, foreign bodies, imperfect root filling, split or perforated roots, roots covered by the mucous membrane, hypercementosis and benign and malignant growths.

#### SUMMARY.

In summing up, for the operator, we will say that the chief value of radiography in dental and oral medicine and surgery is in diagnosis, for it enlarges our survey and broadens our knowledge of the field we study; governs our judgment; verifies or contradicts our opinions; insures an absolutely correct diagnosis

many times with an exact knowledge of anatomical and pathological conditions and maps out clearly and concisely our operative procedure and technique, thereby giving us more rapidity, exactness and skill in operating. We may also add that it is indispensable in a differential diagnosis or one by exclusion and a great help in watching the progress of a case and deciding if a cure has been effected.

From the patient's standpoint the use of the Roentgen Ray is invaluable, for by the aid given the surgeon the patient suffers a painless, aseptic and accurate examination and a shorter and more skillful operation. Hence, he undergoes less pain and shock, and the unnecessary removal of tissue with its resulting deformity and disfigurement is done away with. He, therefore, enjoys a more speedy recovery or improvement.

We will conclude by saying that a radiograph often changes our meagre, indefinite and faulty knowledge of conditions to a clear, complete and perfect understanding of them. In other words, it leads us from regions of uncertainty, darkness and doubt to realms of scientific light, positiveness and accuracy.

## THE SCOPE OF MODERN ORTHODONTIA.\*

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ROBERT H. W. STRANG, M. D., D. D. S., BRIDGEPORT, CONN.

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It is comparatively few years since the sole object of treatment of mal-posed teeth was the improvement of the esthetic appearance of the patient. It proved unfortunate that to such a demand orthodontia should owe its origin, for the natural result was the establishment of a shortsightedness which held this branch of dentistry at a standstill for years. Desiring only to gratify the wish of the patient all else was sacrificed to this end. The treatment was limited to such teeth as were visible to the eye, and by the extraction of one or more of their less fortunate brothers located beyond the direct line of vision a fairly good alignment was obtained, which might or might not be permanent.

Whatever real thought and study was given these cases was centered on the devising of mechanical appliances to move these few unsightly teeth. Each tooth was treated as a distinct and separate piece of anatomy, as if it had no relation to its fellows or to any of the other structures within the oral cavity. As the lower jaw was usually hidden by the lips it was gladly unmolested. That every tooth in each arch was but a small though essential part of one of the most important organs of the body no one seemed to grasp. Thus fundamental principles were all neglected while the mechanical genius reigned supreme.

Such was the situation when Dr. Edward H. Angle completely revolutionized orthodontia, changed it from the empirical to the authentic, and from the mechanical to the scientific by advancing as its working principle one of nature's fundamental laws, i. e. the law of occlusion.

Let us study for a moment this evolution in its various stages that we may better appreciate what a remarkable advancement it was. Having conquered the mechanical side of the problem by devising a set of appliances which in their various combinations could be adjusted to suit the requirements of all cases, Dr. Angle began to devote his attention to a more scientific study of these deformities. When mastering those subjects which have to deal with the arrangement of the component elements of the body he

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\*Read before the Massachusetts Dental Society June 14th, 1910.



became impressed with the fact that nature invariably carried on such work in a definite manner, and made all her creations whether plants, animals, or man, to conform to certain fixed laws. In other words there was always a normal for every structure. Was there then also a normal arrangement for the teeth?

The attempt to study the teeth from this point of view revealed a factor of much importance, i. e. that it was impossible to make any deductions from observations made on a few teeth in one arch only, but that all the teeth in both arches must be considered, and then, not individually, but as a whole. This led to the conclusion that all the teeth taken collectively with their supporting structures might properly be considered to constitute one of the organs of the body whose function was mastication.

Study of various other organs disclosed the fact that they were made up of tissues which could be separated into two distinct classes. The Principal or Functioning, always arranged as to their various elements in a definite and constant manner; for example the cells of the liver and the tubules of the kidney; and the Subsidiary or Supporting tissues, secondary to the principle and placed there simply to hold the former in position.

If therefore, the dental apparatus was really an organ, it must also be built on similar plans, and there must be a normal arrangement for its functioning parts; i. e. the teeth, the tongue, the cheeks, and the lips. The latter structures being composed of soft, yielding, muscular tissue would naturally conform to any position that the teeth chanced to occupy, hence it was decided that the problem to be solved was the finding of a normal arrangement for the teeth.

Comparative anatomy gave a wide field for research and a definite and constant law of collocation was seen to invariably exist in this part of the dental apparatus. This law was found to hold equally true in the primates, primitive man, and finally in civilized man where development had gone on normally.

At last Dr. Angle had found something that could be used as a basis for all treatment, the object of which now became to place each tooth in its correct relation with every other tooth that from the whole might be evolved a normal organ of mastication. This then was the beginning of truly scientific orthodontia.

This arrangement of the teeth in such a normal organ has

received the name of normal occlusion or according to the law of occlusion, and while its truth has been challenged many times it still stands to-day as the fundamental law from which all principles of diagnosis, treatment, and retention emanate and presents itself as the perfect ideal which every modern orthodontist strives to equal when the finished case passes from under his care.

A study of the normal organ of mastication now becomes necessary that we may familiarize ourselves with this law of occlusion and further that we may be prepared to recognize the various deviations from the normal which presents themselves to us.

The teeth, thirty-two in number, are arranged in two gracefully curving arches, the upper being slightly the larger in diameter so that the lower is overlapped by it. While each tooth varies in size and pattern according to its function yet this variation bears a definite relation to the size and pattern of every other tooth, so that in the assembling there is perfect harmony in the organ as a whole.

With the exception of the incisors, the occlusal or grinding surface of each tooth is marked by one or more elevations or cusps from which, running in four directions are broad and sloping surfaces. These are known as inclined planes and it is the sliding of these inclined planes one over another that reduces the food mass to its proper consistency for assimilation.

Furthermore, some of the cusps act as pestles for which converging inclined planes form mortars and retain the smaller particles of food until sufficiently triturated when the little sulci between the cusps furnish channels of escapement for the liquified product.

When the normal organ is at rest, some of the inclined planes are in contact with corresponding planes in the opposing teeth. In other words certain of these occluding planes are paired off, a lower with an upper, in a definite manner. As all of the inclined planes which run in an uninterrupted series from one tooth to another are thus paired off, with the exception of the last in the upper arch, we can readily see that one arch taken as a whole must bear a constant relation to the other, and sufficient proof has been furnished to show that the key to this normal

position is situated in the cusp relation of the first molars. Hence these teeth may properly be said to be the most important in the whole organ.

Of the supporting structures which go to make up this organ the peridental membrane and the alveolar process are most intimately related to the teeth and therefore may be mentioned first. Dr. Noyes describes the former as "That tissue which fills the space between the root of the tooth and the bony walls of its alveolus, surrounds the root occlusally above the alveolar border, and supports the gum." It is composed principally of white fibrous tissue and these fibers are beautifully arranged to resist all forces tending to change the position of the tooth in its socket.

The bone of the alveolar process is of the cancellated variety. The trabeculae are so distributed as to withstand perfectly the strain exerted upon them as the food is masticated, while they also by virtue of their elasticity, act as cushions preventing shock to surrounding structures. We find further that the bones on which the alveolar processes are placed are designed to give and to receive the necessary amount of force required to give perfection of function. Furthermore, the superior maxilla which being stationery is the recipient of all this force, and this has been estimated to amount to from seventy-five to eighty pounds just in ordinary chewing, is braced on all sides by large buttresses formed by the molar bones, the frontal bones, and the sphenoid. These in turn are reinforced by flying buttresses, the zygomatic process and the frontal process of the malar bone.

When we consider the extent of facial anatomy thus intimately related to the organ of mastication and add to this all the bone territory covered by the various muscles of mastication, the sum total of which depends as to its perfect development on the amount of use that is given this one organ, is it any wonder that the human race, which modern civilization has turned into a race of gluttons, is now suffering from lack of growth in the lower two-thirds of the head manifested by the great prevalence of nasal obstruction and malocclusion.

While the picture of the perfect organ still remains clear to us let us study for a few moments some of the underdeveloped and mal-formed organs which we are called upon to treat from

day to day. All of these malocclusions can be divided into three great classes. Class I includes all of those cases in which the lower jaw as a whole is normally related to the upper as shown by the correct cusping of the first molars, but in which there is lack of development in the anterior portion of the arches. In Class II are all those cases in which the lower jaw is occluding distal to normal, either on both sides or only one, while in Class III are all cases in which the lower arch is mesially related to the upper, either on one side or both.

In all of these mal-conditions we find more or less loss of function in proportion as the inclined planes are prevented from sliding together, or the mortar and pestle action of the cusps is lost or free action of the tongue and lips is barred.

If we add to this handicap the natural tendency of the child to bolt its food we get practically an omission of the function of mastication in nearly all of these cases. What then does this mean to the body economy?

An exhaustive study of this subject was made by Dr. Campbell of London, England, a few years ago and I will draw my conclusions from his deductions as published in Mr. Fletcher's book entitled "The A. B. Z of Our Own Nutrition."

Probably the first injurious digression to be noted is the tendency to overload the system with food substances. The various metabolic processes require but comparatively little to maintain a state of equilibrium. Even the Volt Diet, (Proteids 118 grams, Fat 56, Carbohydrates 500, and Heat Units 3055), has been found to be considerably in advance of the actual requirements of the system. The average person hurridly bolting his food without mastication will pile in nearly double this amount specified in this dietetic standard before his appetite is appeased. All this excess is not only an absolute waste but is a great tax on the digestive organs in their efforts at elimination, using up energy which should be utilized to combat bacterial invasion and all pathological conditions. Furthermore this waste material lies in the lower intestinal tract as a mass of fermenting, decomposing, and bacteria-laden debris, constantly producing irritation locally and giving forth toxins which pass into the blood and lymph and must be counteracted elsewhere.

Thorough mastication overcomes this serious condition in



two ways ; first by checking the quantity of intake, and second, by reducing the material to that condition where it may be thoroughly digested before reaching the lower bowel, thus reducing the waste to minimum.

Often where the food is eaten hastily large masses enter the stomach and remain there unchanged physically for hours, while chemically they are rapidly decomposing and giving off poisons. These irritating lumps may be passed in this condition into the intestines and start up a series of inflammations there. Sooner or later such acute attacks result in pathological changes in the mucous lining of the digestive tract, secretions are altered, and a condition of chronic indigestion is the result, while the toxins so freely thrown out, will in all probability, also produce a chronic inflammation in the organs of elimination, particularly the kidneys and the liver.

Not infrequently are these large unmasticated lumps of decomposing food the direct cause of acute appendicitis. They produce this condition by lodging in the caecum and remaining there long enough to start up an active inflammation of its walls which is transmitted to the walls of the appendix by continuity.

As the digestive action of the saliva is limited entirely to starchy foods we find that when this secretion is not given time to act large quantities of practically pure starch are passed into the stomach. This starch is an active stimulant to the gastric juice. At first thought such a condition as this may seem beneficial but let us remember that the hydrochloric acid in the gastric juice is neutralized by the proteids in the food and that these are of relatively small quantity as compared to the carbohydrates, so that they are all exhausted and their neutralizing action lost long before the starch is passed on into the intestines. Thus the stomach becomes loaded with hydrochloric acid in a free state. And a condition of hyperchlorhydria is the result. All this excess of starch which is the direct cause of this condition should have been digested by the saliva during the process of thorough mastication.

This overabundance of undigested starch may also lead to a persistent flatulent dyspepsia from fermentation and this is always accompanied by a great outpouring of toxins. Particularly is this condition found in children for they are usually given

a very high percentage of carbohydrates in the form of soft, pappy food which they swallow readily without chewing. This soon produces a state of general malnutrition, the first symptom of which is the tendency of the mucous membranes to become inflamed on the slightest provocation, shown in frequent attacks of tonsillitis, pharyngitis, bronchitis, etc.

So much then for the effects of impaired mastication on the body functions in general, time does not permit our going deeper into this side of the subject.

But loss of function is not the only evil that results from an underdeveloped condition of the organ of mastication. Of equal importance is its effect locally, upon those structures so intimately associated with it. I refer particularly to the nasal cavity and its accessory sinuses.

In our study of the process of development of these two structures, i. e., the oral cavity and the nasal, we cannot but be impressed by the close relation existing between them during this entire period. Comparison of the head at birth with the adult head shows that as growth proceeds there is twice the amount below the nasal spine of the frontal bone as there is above it. Passing in our study to this region of greatest change we see that in the adult it can be divided into thirds, the upper of which is occupied by the nasal cavity and the lower two by the organ of mastication. When however, we attempt to study the child's head from this point of view we find that we are unable so to divide it for there is a fusion, as it were, of the upper two thirds and that territory which is entirely nasal in the adult is here more than half given over to the developing tissues of the organ of mastication. To be more specific all that part of the nasal cavity which lies below the lower border of the orbits is literally lined with tooth germs. From this we may deduct that the great downward growth in the lower half of the head is due primarily, to the formation and subsequent eruption of the functioning tissues of the organ of mastication and secondarily, to a continued growth of bone thrown out to act as a supporting structure for these tissues.

This downward growth begins with the eruption of the temporary denture and continues until all the teeth anterior to the first molars are in position. After the completion of the tem-

porary denture two new directions of growth manifest themselves—a forward one to make room for the developing permanent molars, and a lateral or expanding growth to allow for the difference in size between the temporary and permanent teeth.

Owing to the fact, as we have seen, that the lower half of the nasal passage is limited below, in front, and on both sides, by these tooth germs, it can only enlarge in these directions as the normal downward, forward, and lateral growth of the organ of mastication proceeds. Therefore just in proportion as the development of the dental apparatus in these three directions is perfected so is the growth of that part of the nasal passages below the level of the orbits complete and conversely, any underdevelopment in the organ of mastication must necessarily produce a corresponding underdevelopment in this portion of the nose. All malocclusions are the manifestations of oral underdevelopment, therefore all malocclusions may be said to be accompanied by more or less nasal imperfection.

Clinical evidence has fully proved this, for treatment of malocclusion is time and again accompanied by beneficial results within the nasal cavity, not only expressed by improved breathing but demonstrated by actual measurement. For this reason many cases of nasal stenosis attended by mouth breathing will never yield to rhinological treatment alone. Adenoids, bony spurs, or even turbinates, may be removed but without relief. And for sufficient reason. Nasal treatment does not remove the cause, i. e., the underdeveloped condition of the superior maxilla, a bone deformity, which the rhinologist alone cannot overcome.

Even in those cases of mouth breathing where the etiological factors are located primarily within the nasal chamber or about the posterior nares such a profound change is soon wrought in the dental arches by a perversion of muscular force that removal of this primary cause only reveals the bone deformity as a secondary cause, so that the treatment cannot be completed without a restoration of the osseous structures to normal.

When oral breathing has extended over a period of a few years the changes in the structures of the organ of mastication are extreme. In such cases the bony walls of the nasal cavity are likewise affected. This is shown by deviations in the septum and by a great lack of lateral development. There may be even

an approximation of the turbinates and the septum. Furthermore, in most of these patients the malocclusion is so pronounced that it becomes a physical impossibility to bring the lips together and the oral cavity remains open constantly. Case after case of this character comes to the orthodontist with history of removal of the nasal obstruction perhaps years before, yet with the mouth breathing just as pronounced as ever. Now let the treatment be taken up where the rhinologist left off and carried on to completion by the oral specialist and the change is marked.

Finally there is that group of very interesting cases in which there is a distinct lack of development in the premaxillary region. Its effect upon the nasal cavity has only recently been appreciated. In such cases there is almost invariably a marked deviation of the nasal septum, while the inferior turbinate bones are found to closely approximate the floor of the nose. Misinterpretation places the blame on these nasal tissues, but a more rational and correct explanation is a lack of downward and forward growth of the nasal floor. Such patients need orthodontic as well as rhinological treatment.

Do not think for a moment, however, that I am attempting to criticize or belittle the specialty of rhinology. Far from it. My aim is only to show how intimately associated are these two specialties, the field of the one overlapping that of the other, and neither being independent. The orthodontist can never expect permanency of results in many of his cases without nasal treatment, while I believe I have clearly shown that the rhinologist must look to the oral specialist to complete much of the treatment which he can but only begin.

As you may have noted, nothing has been said of the esthetic side of the question except to mention it as the principle factor in the original demand for orthodontic treatment. However this paper would not be complete without transcribing from Dr. Angle's book one short paragraph which allows us to dismiss this side of our subject with perfect satisfaction. I quote as follows: "The best balance, the best harmony, the best proportions of the mouth in its relation to the other features require that there shall be the full complement of teeth, and that each tooth shall be made to occupy its normal position—normal occlusion," a normal organ of mastication.



## DENTAL REMEDIES—TREATMENT OF DENTO-ALVEOLAR ABSCESS, INCLUDING THE FILLING OF ROOT CANALS.\*

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BY JOHN P. BUCKLEY, PH. G., D. D. S., CHICAGO, ILL.

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Mt. Tom, Mass., June 15, 1910.

Members of the Massachusetts Dental Society:

*Ladies and Gentlemen:*—If a delightful environment, the association of friends and the presence of ladies, coupled with a somewhat surprising introduction, are sufficient to bring out the best there is in a man, I certainly am at your mercy this afternoon.

I feel, I cannot help but feel, that I am among friends when I am in the New England states. I always enjoy the presence of ladies; in fact some of my friends in Chicago have gone so far as to call me a ladies' man. I don't object to it at all. I know of no place wherever I have been where the surroundings were more delightful than these which we experience this afternoon.

I am just a little surprised at the introduction given me by your president when he says that I am the best in my line,—and this reminds me of something that happened to ex-Senator Spooner of Wisconsin. The senator was surprised one time at being introduced and as a result of that surprise he delivered a lecture which he did not intend to deliver at the time, but which lecture nevertheless characterized him as an after-dinner speaker. This man was traveling around through the state of Wisconsin talking in behalf of the candidate for Congress. He had spoken in several different communities and was billed to speak in a German settlement. The president of the local Republican club introduced the senator in something like this fashion: "Gentlemen and ladies, I have the pleasure of introducing to you the Honorable Senator Spooner who to you will make a speech, yes. I have now done so. He will now do so." It is said that Senator Spooner forgot what he intended to say, and the speech which he delivered, as I have said, ever afterwards characterized him as a public orator, or a public speaker.

When I was coming down on the train I looked over your

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\*Read before the Massachusetts Dental Society June 15th, 1910.

program and I saw several things of interest. One thing that interested me was the fact that my good friend, Dr. Cook, was to be with you on this occasion. That reminds me of a story of the cockroach meeting the bedbug at a church social. The cockroach met the bedbug and he said, "Hello, Betty, you here?" "Yes." "Well, did you get an invitation?" "I did or I wouldn't have come." "Did they invite you?" "Certainly." "Well," said the cockroach, "I wonder what in the devil they wanted of both of us." Now when I saw that Dr. Cook was to be here and that he was to have an opportunity of getting at you first I wondered what in the world you wanted me to come for.

Another thing that interested me in this program,—and a thing more directly related to my subject,—was a standing resolution that I saw on page 21, wherein you say: "Resolved, That it is the sentiment of the Massachusetts Dental Society that it is unethical for its members to use or prescribe remedial or prophylactic preparations unless the ingredients and amounts of such ingredients are given." I wish you had included in that resolution two things more. I wish you had given it as your ideal of the things that should exist that it is unethical to prescribe remedies where there is secrecy about the formula. I wish too that you had said that it is also unethical to prescribe or use a remedy wherein there is intentional deception on the part of the manufacturer. And I wish too you had included that in your opinion it is unethical for any manufacturer to exploit to the laity and teach that which you know to be wrong and which I know to be wrong,—self-medication. I agree with this resolution, and I agree with more than is incorporated therein. I don't like to use a remedy in my practice—I believe it is absolutely unnecessary to use a remedy in the practice of dentistry—wherein the formula is not published, wherein there is any deception on the part of the manufacturer. And I know it is wrong to exploit proprietary remedies to the laity encouraging self-medication.

The remedies to which I shall call your attention in the diseased conditions which we expect to cover this afternoon, are not remedies which savor of this variety. The formulas are all published and it is your privilege to take those formulas, wherever you can, and have them compounded.

I had almost wished when I saw this resolution that I had

chosen the subject of general dental medicine to discuss with you today. But inasmuch as I have not I will confine myself to the treatment of putrescent pulps and the conditions which result or can result therefrom. I think perhaps it is better on the whole that I do so, because by so doing I can go into details and it is, after all, the details that count in dental therapeutics, as well as it is the little things that count in life.

There is a tendency today in dental medicine, a tendency manifested also in general medicine, to place the treatment of diseased conditions upon a rational basis. We are no longer satisfied to know that by the use of a certain remedy we can get a certain result. But the live, active, up-to-date, energetic practitioner of today wants to dig down into the subject and learn why those results are brought about. Now you can use many remedies in the treatment of putrescent pulps and abscesses with which you can get a result ultimately, if you have a sufficient amount of patience,—I mean both patients on which to operate and patience to stay with you until you cure the disease. But you cannot tell why you get the result by the use of that remedy unless you know the pathological conditions back of it.

Successful therapeutics depends upon three things: a knowledge of pathology, a knowledge of pharmacology, and a knowledge of certain, at least, pharmaceutical laws and their practical application in therapeutice. I say you cannot tell why you get a result in your effort to treat a putrescent pulp and in your effort to cure an abscess, unless you know something of the pathology back of that condition.

When I apply a remedy to a canal of a tooth which is filled with putrescent material I want to know something about the nature of that material, I must know something about it, in order to be able with my eyes open to select the drug or the remedy which is indicated in that particular condition. If I do not know anything about the nature of the contents of a putrescent canal I am using remedies empirically, I am using remedies with my eyes shut, I am guessing at the possible result,—and that is exactly what I do not want to do.

Now in order to find out something of the nature of the contents of a putrescent canal it is necessary, it seems to me, that you know something about animal tissue and the changes

that can or are liable to take place when that tissue dies and undergoes decomposition.

Animal tissue is composed, as I have outlined on the first chart (indicating), of three kinds of substances: proteids, carbohydrates and fats. These three substances are divided into two general classes,—those that do and those that do not contain nitrogen. The compound that contains nitrogen is the *proteid*, and this constitutes the main part of all animal tissue. The compounds that do not contain nitrogen, are the *carbohydrates* and *fats*.

In the proteid molecule we have arranged complexly several elements, nitrogen being the characteristic one, the one by which the compound is characterized. Other elements that enter into that complex compound are carbon, hydrogen, oxygen, nitrogen as I have said, a little sulphur, not much, some phosphorus, and in one peculiar proteid compound, the hemoglobin of the blood, we find iron. The elements that are arranged, not so complexly, but still quite complexly, that form the carbohydrate and fatty compounds, and which are constituents of the original animal tissue, are three: carbon, hydrogen and oxygen, arranged in various forms. The exact arrangements we do know in these two classes of compounds, but I will not burden you with emphasizing their proper arrangement. We do not know exactly how the elements are arranged in the proteid compound.

Now then I do not know that the pulp tissue differs in any particular essential from any other animal tissue, I mean so far as the elements are concerned which unite together to form these three classes of compounds. I know that the pulp tissue differs structurally; I know that the blood vessels and nerves that enter the pulp tissue are not the same structurally or the same histologically as are these same structures in other animal tissue. I know that under the microscope the pulp tissue shows a different arrangement than other animal tissue does. I know that in the pulp tissue there are no lymphatics, a thing of pathological interest. But I say that so far as the chemical elements that enter into the composition of animal tissue are concerned I do not believe that the pulp tissue differs in any particular essential from any other animal tissue.

I would like, just as well as any of you, when I get a putres-



cent pulp to take its contents and transfer them to a test tube and then take that test tube to a laboratory where I could apply my reagent in order that I might find out definitely just what was in that test tube and from that say definitely what there is in a putrescent root canal. But I cannot do that. The amount is so infinitesimal in a putrescent pulp, the amount that I could remove, that I cannot transfer it to a test tube,—I have not thus far been able to do so at least, I don't know what the future holds in store,—and make a definite chemical test.

Inasmuch as I have not been able to do that, and since I would like to, it seems to me that the next best thing I can do is to study what takes place when animal tissue decomposes and then by means of analogy find out what there must be in a putrescent root canal. We have good works on putrefaction: we have Vaughn and Novy and other men with whose names you are familiar, who have been working on the decomposition of animal tissue.

I believe, studying this problem in this way, that when a pulp dies and is invaded by pathogenic microorganisms, the rearrangement of the elements which takes place in those three classes of compounds is something like this: I know that it depends upon the conditions, it depends upon the character of the germ, it depends upon whether oxygen has access to that canal or not. There are many things which govern the action of micro-organisms on a dead pulp, but generally speaking I believe we are safe in coming to these conclusions:

When that pulp tissue dies and undergoes decomposition we have two classes of compounds formed, generally speaking, *intermediate* and *end-products*. These I have arbitrarily divided. Some one else may disagree with the division I have made. It is only an arbitrary division of these compounds, but for clinical reasons that I may be guided correctly in my treatment I so divided them.

In the class of intermediate products I have put certain ptomaines that can be formed, three of which I have mentioned. I do not simply mention these three and exclude others, because I know there are other ptomaines formed; but I have mentioned the ones which I believe to be the most toxic in character. Then there are also amidoacids, among which we find leucin and tyrosin,

—nothing of particular importance, except the fact that the two contain nitrogen combined with hydrogen, the  $\text{NH}_2$  radical which, together with the ptomaines, can be further putrefied, and as a result of that further putrefaction ammonia, a gas, is formed, and it is the ammonia to which I want to call your attention especially.

As to the class of end-products we have many things. We have fatty acids such as acetic acid and carbonic acid (the latter breaking up at once into carbon dioxide and water), carbon monoxide, methane, hydrogen and sulphide,—we always have that, not in the quantities that we have been led to believe it exists by some writers, but nevertheless we have hydrogen sulphide as an end-product of the putrescent pulp. I know we are liable to have all these various end-products formed, but I think the ones that are formed in any quantities, those that are formed in a sufficient quantity to be taken into consideration in our treatment, are ammonia and hydrogen sulphide, and in the intermediate products the ptomaines and amido-acids.

If we understand, as we do now in a measure at least, the nature of the contents of a putrescent root canal, we know that we have these things with which to contend—together with bacteria. I have been accused, and perhaps justly so, of forcing bacteria into the background and pushing to the foreground the intermediate and end-products of pulp decomposition. I have never, in all my writings, ignored the presence of bacteria, because without them we could not have inaugurated this complicated process of pulp decomposition. I have probably been justified,—I am going to make myself believe, for the time-being at least, that I have been justified,—in pushing bacteria to the background and pushing forward these other products of pulp decomposition, for the reason that heretofore, it seemed to me, we only had the one thing in mind in treating these conditions, and that was to kill the germ—get an agent that will kill the germ and all the rest will be taken care of.

I can use an agent that will kill the germ, or I can name agents which in a test tube will kill germs,—bichloride of mercury, sublimine, chinosol. They will kill a germ in a test tube and I don't know why they wouldn't kill a germ in a putrescent pulp; the two conditions are somewhat similar. But these agents that

we know are good disinfectants, if used in these conditions, will not give us the result that we are looking for.

One thing I want to do in treating this condition is to open into the canal which is putrescent and, after having made my diagnosis, put in my remedy and seal it hermetically. I have tried bichloride of mercury, a good disinfectant; I have tried chinisol and sublimine—I have tried them all and none of them will give me the result I want but one. That one is formaldehyde gas.

Now then, we are told that formaldehyde, because it is a gas, penetrates the entire contents of the canal and cripples or kills the germ, and as a result of that killing of the germs all else is taken care of. I don't know definitely, but I don't believe that that is all it does. I believe that formaldehyde gas will act upon the intermediate and end-products of pulp decomposition.

I have every reason in the world to believe that there are intermediate and end-products in a putrescent canal. You know there are; you know from the odor. It isn't the odor of hydrogen sulphide you get from a putrescent root. It is a putrefactive odor. Oftentimes that comes from the ptomaines, animal alkaloids, saturating the dentine to a certain extent, that are contained within the putrescent canal. So you know, whether you have given this subject any special thought or not, from the experience you have had in opening into canals which are putrescent, that there is something else there beside bacteria, and I believe we ought to take that something else into consideration in our treatment.

Now then, ladies and gentlemen, knowing something of the nature of the contents of a putrescent root canal, it seems to me I can step over to my drug room with my eyes open, with a lantern turned in so I can see and think. I have got some light upon the subject. Now I can select my agents to be used in these roots with more satisfaction, because I want something that will kill the germ and I want something, too, that will act upon these intermediate and end-products of pulp decomposition.

The agent that I know will do it is formaldehyde gas. This gas occurs in commerce in a 40 per cent. solution, and is also recognized by the U. S. Pharmacopeia in a 37 per cent. solution called liquor formaldehyde. Schering puts up the 40 per cent. solution called formalin. I have tried to use that alone, knowing

it possessed valuable properties in the treatment of these conditions, and I did not get the results that it seemed possible for me to get. I have diluted the solution and hermetically sealed it in the tooth. The patient would go home and I would not have any pathological symptoms manifested past the end of the root,—all of which I was pleased with. But if I was not exceedingly careful, even in my first treatment, I had too many “lame” teeth with which to contend when I used a solution of formaldehyde alone. I know and you know that formaldehyde gas is one of the most irritating substances known to chemistry. I don’t know of anything, if it gets into animal tissue, that will stir it up, make it more painful and destroy the tissue much better than formaldehyde gas. We have got to be careful in using this agent to see that we do not seal in more than enough to neutralize the intermediate and end-products, and if some of it gets past the end of the root the chances are we will have to extract the tooth. This, of course, would be the result of pure carelessness.

Now then I want to use this gas. It seems to me to possess almost every property essential for my rational treatment of these conditions. I can use it if by some means or other I can harness up the gas, if I can make it do what I want it to do and not do any too much. You can do that if you will mix formaldehyde gas, or the solution of the gas, with anodyne remedies. Beechwood cresote has been used, but these solutions will not mix; you have a milk solution. You can add a little alcohol to the solution and clear it up. That is not a bad remedy at all to use. You can take phenol, the old carbolic acid, if you can get it clear, and colorless, and mix that with the solution of formaldehyde.

You can do better than that. Take cresol, a remedy which I believe was introduced into dental practice by Dr. Cook and Dr. Mawhinney, or the two working together. You can take that drug and mix it with formaldehyde solution and you can master or harness up and control the irritating properties of formaldehyde gas. Beechwood creosote is not a bad thing to use. Phenol is better; better because it is a stronger disinfectant than beechwood creosote; better too because it will mix with liquor formaldehyde in all proportions without the addition of alcohol. Cresol, formerly commercially called tricresol, is better than either beechwood creosote or phenol, for this reason: cresol is a better dis-



infectant by far and has been so proved by men who have studied the action of drugs and remedies upon the tissue, organs and function of the body. Cresol being a better disinfectant than phenol and phenol being better than beechwood creosote, if there is no other objection I should use cresol.

Cresol and formaldehyde in solution mix in all proportions, so I have no objection to using it from a pharmacal standpoint.

Then too I told you that besides the gases that are formed, besides the ptomaines and amido-acids that are formed as intermediate products and besides the bacteria that are always in evidence in an active putrescent canal, you have the fats or fatty acids. I didn't emphasize it, but I will now call your attention to it again. I want you to know it because I believe cresol will act favorably upon the fats that result from pulp decomposition, and as a result we will have lysol or something analogous to it produced.

Now then, what do you do, or what is your method of treatment? When a tooth comes in, you tap it and find it is a little sore; it may be a little off-colored, it may not be, it may not be even responsive, but for some reason you believe the pulp is dead. You make your diagnosis and find you have a dead pulp in this tooth. The thing to do is to aseptically open into that canal, expose the mouth of it and seal in some remedy. If you want to seal that remedy hermetically there must be formaldehyde in it. Any manufacturing concerns that make their so-called celebrated abscess cures and tell you in their literature that you can seal their remedy in contact with putrescent root canals hermetically, whether they tell you or not, you can put it down that if you can do that which they say you can do, and you can ordinarily, their remedy contains formaldehyde.

I want you, if you are going to treat these conditions rationally, to use a remedy which contains formaldehyde. I would prefer to have you use—and I know you would use, being members of this society—a remedy, the constituents of which you know. You never ask a manufacturer how he mixes his remedy, but you have got every reason to ask, it is your duty to ask, what the constituents of that mixture are. Then one of the things that ought to be in this remedy, I don't care which one you use, is formaldehyde gas. This gas ought to be masked in some way. The way

I have masked it is the way with which you are all familiar, by taking equal parts of cresol and liquor formaldehyde.

I will open into this suspected tooth aseptically. There are three things I want to do in treating a putrescent pulp or abscess: I want to establish and maintain asepsis—and I wish to emphasize this point, because I believe there is a gentleman present this afternoon that may convince you I am wrong when I say I can sterilize a putrescent canal with formocresol. If he does, I will take off my hat to him. I believe that I can establish and maintain asepsis by the use of formocresol. That is the first thing I want to do.

The second thing I want to do in treating a putrescent pulp or abscess, especially where I want to preserve the crown of the tooth, is to preserve or restore the color of that tooth. If the crown is not discolored before the patient comes to me I can by the use of formocresol preserve in every instance the color of that tooth. I could not do that way formerly; I had to make a "vent hole" admitting oxygen or air into the interior of my tooth to prevent the tooth from aching. Where I can hermetically seal the tooth where it is not discolored before presented for treatment, I can preserve in every instance the color of that tooth. If the color of the tooth is lost before the patient presents it, it is my duty, not only to maintain asepsis in the entire treatment, but before I fill the tooth to restore the color of the crown of that tooth.

The third thing I want to do is to thoroughly fill the root, that recurring sepsis may not take place. These are the things that theoretically I am going to do here this afternoon. I am going to establish and maintain asepsis; I don't preserve the color of the tooth because I have not got the tooth, but I am going to theoretically fill the root.

I take this suspected tooth, open into the pulp chamber freely; if it is a multirooted tooth I have got to be careful when I open into that crown that my chips in any endeavor to open into it, or my bur, do not clog the mouth of some of those canals

In using formocresol you want to do two things. I more frequently turn that around and say you want to do one thing and you don't want to do another. The one thing you want to do after you have made your diagnosis and opened the pulp

chamber, is to expose the mouth of the canals; not only be sure you are in the pulp chamber but expose the mouths of the canals to the action of the remedy. Your tooth will ache if you simply take care of the intermediate and end-products and bacteria that are lurking in the pulp chamber and if your debris of some kind or the chips from the drilling have clogged up one of the canals of that multi-rooted tooth. You scarcely ever have trouble in a single-rooted tooth, as is illustrated on the board. The thing you want to do in using this remedy is to have the mouths of all the canals in that tooth exposed to the action of the remedy.

The thing you don't want to do is to make any pressure in your effort to hermetically seal the tooth. I seal with cement. I don't care whether you use a temporary stopping or gutta-percha or cement or anything else if you hermetically seal it. If you have not confidence enough in this remedy to seal it hermetically, I don't care how bad an odor you have, at the first sitting, I would not advise you to use the remedy.

If you have done the things I have told you to do: opened into the tooth, exposed the mouth of the canals, sealed in your remedy—and be sure you have a good remedy, I don't want one that has been in your office a year or a year and a half—sealed that tooth without pressure, you can go home and sleep and your patient will go home and sleep.

I like to use cement, because I don't want my remedy escaping into the patient's mouth; I don't want to use a remedy that it is necessary for me to puncture, for the saliva laden with bacteria will be constantly entering my puncture and dissipating my remedy. I can do better with cement than I can with gutta-percha or temporary stopping.

The method of sealing in the remedy does not amount to anything providing you seal it hermetically and without pressure. Frequently in an occlusal cavity of a bicuspid or molar you may be successful in hermetically sealing in your remedy with gutta-percha, but the tooth being so comfortable your patient will eat on that side and in mastication will force the gutta-percha down in the cavity, and in this way the remedy or the contents of the canal which have not yet been neutralized will be forced past the end of the root.

It wouldn't use cement if I had to stand up half an hour to drill it out when the patient came back for the second sitting. I wouldn't hesitate to use it, however, and do that drilling because I was afraid the tooth would be so sore when they came back I couldn't fan it with a feather. If I am afraid of that I have no confidence in my remedy. I have every reason to believe, doing my duty, that that tooth will not be sore and that the membrane will not be affected—I don't say infected,—affected.

But I wouldn't use cement if I had to spend a long while drilling it out. I don't do that. I take a small pledget of cotton, dip it in my remedy, place it in the mouth of the pulp chamber and then fill most of the cavity with cotton or little concave disks. Then a veneer of cement over the dressing will hermetically seal it. I want to be very careful to have this gingival margin dry, because if that is not dry my remedy will leak out just as well with cement, and probably better, than it would if I had used a temporary stopping or gutta-percha. I say I don't care how you seal this remedy in as long as you seal it hermetically, and I don't care how bad an odor emanates from that canal.

Then at the second sitting, after adjusting the rubber dam and sterilizing the teeth included, I drill in through that cement and pick it out and then at this time I have every reason to believe from the history as related by the patient and from what I am able to observe, that the intermediate and end-products have been neutralized.

Now I can with some safety take the proper broach and go into that canal. I might have done that at the first time; Dr Rhein of New York does it; others do it. But I am afraid, no matter how well my technic is developed, I am liable to force a little of the bacteria or the ptomaines or the poisonous intermediate and end-products through the end of the roots. If I do, I am courting trouble that I am not looking for. So I would rather cripple the bacteria and counteract these intermediate and end-products at the first treatment and then at the second treatment, without any hesitancy, go up and mechanically remove all that is therein contained. Usually if the pulp has undergone completely the process of decomposition I have not anything to



remove. If it is partially decomposed I have a leathery like tissue or something of the kind to remove. At any rate at the second treatment I will go up there and remove all there is. If there is nothing to remove I am all the more happy; if there is, I will remove it mechanically.

Now then, I take the same remedy, formocresol, modified, to meet the conditions as found. I don't know of any better disinfectant than formocresol, and I have used them all. I don't know of any better one. I take the formocresol modified to meet the conditions found out at the second sitting and seal it into the canal. One of my friends from Indianapolis said, "You ought to leave the canal open at the first sitting. It is bad surgery to stop up a copious flow of gases; just as bad surgery as it is to stop up a copious flow of pus." There is no such a thing as a "copious flow of gases" in a putrescent root canal. I have had as much to say about the presence of gases in putrescent root canals as any one, I believe, but I cannot make myself believe, because I know it is not true, that there is such a thing as a copious flow of gases. If there were and I left it open a minute, they would all flow out; then I would hesitate to leave it open at the first treatment, as he says.

If there is no odor at the second treatment, as there probably will not be if the first treatment was properly employed, I don't believe it is necessary to use formaldehyde gas in the same strength solution as it was where I had those mephitic gases at the first time. So I will take formocresol, equal parts of cresol and formaldehyde solution and I will drop two drops on a glass slab. Then I will take cresol alone and I will drop two or three drops with it, mix it up and dip in a pledget of cotton on a smooth broach in this modified form—it may be one to three, it may be one to four. It might be that I would take all the formaldehyde out. If I felt there was no indication for formaldehyde I wouldn't use formocresol; I would use menthol, thymol and phenol in phenol compound. I use thymol because it is a penetrating disinfectant and I want to penetrate the tubuli; in other words I want to establish asepsis, as I told you I wanted to do, and to do that I want to kill the bacteria and I want to neutralize the intermediate and end-products lurking in the lumen of the canal or the tubules of the dentine. Now to do that, at

the second treatment, if there is a little evidence of putrescence yet, I would use formocresol up in that canal. If there is no evidence of putrescence I would use the modified formocresol or I might put that remedy to one side and use phenol compound. I want to study these conditions and use my remedies accordingly.

So I say at the second treatment in order to sterilize that canal—and I must sterilize it, I believe I do sterilize it—I will either seal in formocresol as it is, or I will modify the formula to meet the conditions as found, or I will use phenol compound, then I will hermetically seal the tooth again.

At the third treatment I will adjust the rubber dam, take out my dressing and fill the root. Believing that I have established asepsis and knowing in order to keep that condition as it is now I must thoroughly fill the root, I will fill the root. Then before I fill the tooth, if I want to save the crown of that tooth and it is discolored, I will bleach the tooth. I don't believe any operation is a success, I don't care how well you have treated the tooth, I don't care how beautiful the porcelain inlay is, if the shade of the teeth is one or two shades darker than it should be. I don't believe it is necessary to cut off one-half of the natural crowns of teeth we are cutting off and putting on porcelain crowns, simply because of the fact that the tooth is discolored. Sometimes it is; but in fifty per cent. of the cases in which it is being done to-day, it is not necessary. But I cannot stop to tell you how you can restore the color of the tooth.

If at the first treatment when the patient first came to me I didn't have a simple case of putrescence, but some bacteria and putrescent material had already by some means worked their way through the apical end and had "infected,"—now I will say,—the pericemental membrane, then I would do more than that which I have told you I would do where you had a simple case of putrescence.

In other words, if at the first treatment this tooth is sore and responsive and I find septic pericementitis, I will not only go through the process locally just as I have done in a simple case of putrescence but I will direct my attention to the general treatment. In cases where you have pain, and it is severe pain,

if you take care of the things that caused the infection,—if I could put it in this awkward, perhaps homely way, Nature will soon take care of the infection ordinarily and the pain will subside. But the patients will not be satisfied with that. They came to you because they were suffering with pain, and unless you relieve that pain they will be disappointed.

So I say where you have got infection in the apical area, but where there is no swelling,—if there was swelling you would probably have no pain, but pain is one of the characteristic symptoms,—I would not only go through the local treatment as I have indicated, but after removing the rubber dam, I would counter-irritate the tissue and then give some drug internally to help Nature overcome that pathological condition, to act upon the central nervous system to control the pain until my remedy which I sealed in the canal has it controlled.

*Question*—How long do you allow the first treatment to remain in the tooth?

*Dr. Buckley*—Until the patient wants to come; if he wants to come back the next day all right. I would like to leave it there about three days, but you can leave it twenty-four hours or a week, or ten days or two weeks. I would rather, ordinarily, leave it about three days, but the matter is governed always by the conditions that exist at the time.

By counterirritation you can do three things: Stimulate the lymphatics in the parts and make your patient believe you are doing something. They feel you are because you irritate the tissue. That is a mental effect, but it is not a bad one. If you use the right kind of counterirritant you can dilate the arteries subjacently and let the blood go on and not become stagnant. If you do that you will not be apt to have the infected tissue and blood broken down into pus. The thing you want to do is to try to check the development of this incipient abscess. The counterirritant I want to use is any one that has an iodine in it. Some of these aconite and iodine remedies are good but you can make them better by adding to them certain other constituents,—such as menthol, which is a refrigerant analgesic. Chloroform, which is highly volatile, will enhance the action of the other constituents. That makes a good counter-

irritant. That is what I have in this *refrigerant counterirritant*. The formula is here given:

Menthol .....	10 gr.
Iodine (crys.) .....	10 gr.
Chloroform .....	1½ f. dr.
Tincture aconite .....	6½ f. dr.

That remedy applied locally to the gum over the affected tooth in these cases of septic pericementitis will aid Nature in her effort to take care of the tissues which are infected and prevent them from breaking down into pus.

I was especially pleased in looking over this little pamphlet, (issued by the Mass. Dental Society). It is the best thing I ever saw given out to any dental society, absolutely the best, I don't care where it is. There is only one thing you have got to do, and that is to be sure your druggist puts them up as they were intended to be; then you don't need to use anybody's remedy. I am sorry to say that, because I remember there are two or three of my remedies in there, but only two or three, most of them are not mine, so you can forget mine. That is the best thing, I say, I ever saw given out or worked out for any dental society and I am going to take it home with me with a great deal of pleasure and satisfaction.

You can control pain. Get several of the drugs that are indicated in this booklet for neuralgia; for a sedative agent, acetanilide is one, if you know you are giving it. You don't want to give any of these hypnotic headache powders thrown in your doorway, the constituents of which you do not know, but you can give any one that will produce the result, provided you know what is in it. The U. S. P. formula for compound acetanilid powder is:

Acetanilide .....	70 parts
Caffeine .....	10 parts
Sodium bicarbonate .....	20 parts

Almost that same formula is in this pamphlet. Almost every drug I have got here combined with some other drug is recognized by the United States Pharmacopeia. By mixing one or more of the various syrups and tinctures and fluid extracts, etc., simple products and compound products, you can



duplicate any property of the secret preparations on the market to-day. It is absolutely unnecessary to use these various secret formula variety of remedies, and all you need to have is a knowledge of Pharmacopeial titles, and having that knowledge you can simply prescribe for the official Latin title or the English title, so far as that is concerned. It seems to me that is a thousand times more intelligent. As indicated in this booklet you belong to a learned profession and should prescribe that way. They say that no profession should ever aspire to be called learned if they have to depend upon secret formula preparations. And I agree with every word of it. I say it is better, it shows more intelligence on your part, and your patients will respect you more, if you write a prescription like that than if you fill out one of those so-called prescriptions—it is not a prescription—that is furnished you by the manufacturer of various mouth washes and tooth powders and headache remedies, etc., wherein you have got the recipe, the name of preparation printed, also the Dr. or D. D. S. printed, and all you have got to do is to sign your name,—no more than your little boy or my little boy could do. That is not a prescription. And I repeat again that you display more intelligence, you will be better satisfied and your patients will be better satisfied if you take your own printed prescription or a piece of blank paper and correctly write on that paper the prescription that you want the patient to use.

In treating an abscess where you had a putrescent pulp in the tooth once and the patient did not come to you until the infectious material had pushed past the end of the root where it infected the tissues which broke down into pus, and where you make your diagnosis, now oftentimes easy, and you open into the tooth and pus voluntarily flows, you have got to modify your treatment to meet the conditions as found. In this particular case open into the chamber and if pus is flowing out pressure should be made over the apical area. We should mechanically evacuate all the pus that it is possible to do. Here I will make a statement which my Indianapolis friend says is a good statement; but he applies it to putrescent pulps as well as to abscesses; I do not; it is better to mechanically evacuate pus than it is to depend upon some chemical agent for the destruction of that

pus. I make that statement again. If I evacuate all the pus that it is possible to do and if I stay with this case long enough—it may take five minutes or it may take an hour, I don't care how many patients are waiting in the reception room, I have got no business to open into the tooth, slap in some remedy, put in cotton or something else, get the patient out and the next one in,—I have got no business to do that; this patient who comes to me has confidence in me; I ought not to abuse the confidence of my patient and I try not so to do.

I must stay with this condition, five minutes perhaps will be long enough, until I have mechanically removed the pus that is in the canal; probably all that comes down now is a little serous fluid mixed with some blood and pus.

If I can accomplish this I can hermetically seal this tooth. If I have done that as I have indicated I have no reason, no indication, for using formaldehyde in the same strength solution that I did when the entire canal was filled with intermediate and end-products and bacteria which are present in a condition of that kind. So here I will either modify my formocresol, adding a drop or two or three of cresol, and put this clear up into the canal just about as far as I can get it; or if the conditions are favorable I might seal in phenol compound. I seal in something which is a strong disinfectant; phenol compound is that, so is formocresol. If there is a slight odor I would prefer to use formocresol. That is sealed in hermetically. Where I have got a weeping condition in the apical area, where pus is forming rapidly that will fill the canal soon and my remedy will be dissipated, will be neutralized,—in that particular case I want to see the patient the next day.

At the second treatment I ought to be able, if there is no complication, to remove the dressing without pus voluntarily flowing from the canal. If having removed that dressing and as soon as I remove it a flow of pus follows the removal of the dressing, the chances are I have got a complication there. In that particular instance I should mechanically evacuate the pus again as best I could. If at the next treatment, and I shouldn't want this to be more than a day, the pus did the same thing, I would make up my mind there was some complication in the apical area. Here is where I ought, if I have an opportunity

of doing so, and I have where I am located, and many of you have also in the larger cities, to send my patient to a man who does radiography and have a picture taken so I can see how much area is involved.

If in the second treatment pus does not voluntarily flow from the canal, then I can cure that case by sealing the drugs in that canal. When we expect a drug or remedy to reach past the end of the root and cure an abscess where there is a denuded end of root, or absorb process or a rough edge; or in other words, expect to cure a complicated alveolar abscess with or without a sinus, by simply sealing drugs in the canal,—I say we are expecting too much of our drugs—and dentists expect too much of drugs any way. All that you ought to expect a drug or a remedy to do, is simply to aid Nature in her effort to cure the disease. Nature is a pretty good mother. If she were not, you and I perhaps, with the conditions under which we have to work, the hindrances and the things we—I don't know how to say it better than in the vernacular "pass up to Nature" and Nature takes care of—I repeat, we would want to go back to the farm or the school room or workshop from whence we came. Nature is a grand mother. Dentists abuse her too often. When you expect a drug or remedy to cure a complicated alveolar abscess, which needs external treatment or curettement, such a case as Dr. Schamberg operated upon yesterday, you expect too much. If you will do as he does and give this external treatment, you will not ask your remedy which you seal in the canal to do that which a great many dentists expect of their remedy.

Here (indicating) is a complicated abscess, oftentimes you have more root involved than in this, with more process resorbed; the radiograph will assist in the diagnosis. Sometimes, however, a thing will show up on a radiograph that is not really present. I think Dr. Schamberg will bear me out in that. But nevertheless radiography is the most positive means we have of clearing up these complicated abscess cases. It is not absolutely positive by any means.

I say sometimes you get more root involved than in that particular instance. In an abscess like that where you could not get a satisfactory result by sealing drugs in the canal you can open into that canal and establish a sinus. Where it is in a

case like this you would surgically make an opening through the overlaying soft tissue and process, and then treat it with drugs before you amputate the root. Root amputation is not necessary probably; that ought to be the last resort, except one,—extraction. Sometimes we have got to extract these badly affected abscessed teeth.

Next to that is root amputation. We ought not to amputate the root until we have at least tried our therapeutic remedies. When the sinus is established you force through any of the bland solutions; I would suggest peppermint water to which phenol has been added. Where the sinus is established, if it is uncomplicated, I would force through phenol compound. You perhaps have been using 95 per cent phenol and have been getting good results if it is uncomplicated. I like phenol compound better, because it contains thymol. If phenol is good, this remedy is better. Phenol is not as good a disinfectant as you would naturally think, because of its coagulating property. You can force through phenol compound or 95 per cent. phenol.

If your abscess does not cure you need to use a stronger stimulant than that. The remedy I use as a last resort is phenolsulphonic acid. That was suggested I think by Dr. Cook or Dr. Mawhinney. But Dr. Cook used to advocate taking impure carbolic acid, so called, and impure sulphuric acid. That made a mixture that looked to me like the heavy oil they tell me to put in the transmission of an automobile, and I don't like to use in a tooth, where the three things I want to do are to establish and maintain asepsis, preserve or restore the color of the tooth and thoroughly fill the root, any remedy that will further discolor that tooth. It is almost if not entirely possible to have all your remedies that you use within a canal clear. Every one of the remedies that I have suggested is clear, not only clear but colorless.

You will have a great deal of trouble in having the druggist put up phenolsulphonic acid. The way I used to make it is as follows: Heat a certain amount of U. S. P. liquid phenol, in a suitable container, nearly to boiling; then carefully add an equal amount of C. P. sulphuric acid; after which, while mixture is still hot, gradually add as much distilled water as you have



taken of both phenol and sulphuric acid. This makes a 50% solution of phenol-sulphonic acid.

Recently I have had this remedy assayed and find it contains 15% of free sulphuric acid, if made as I have described in certain articles. If you have been reading my writings,—and some of you have been kind enough to do so,—you are more or less familiar with this remedy—the best I could do I had an excess of 15 per cent of uncombined sulphuric acid in the mixture, or in the 50% solution I would have  $7\frac{1}{2}$  per cent. Now I don't want to use sulphuric acid as such; if I did I would take a 5 and  $7\frac{1}{2}$  solution without the phenol. I want that which results from the chemical action of sulphuric acid on phenol. Mr. Hereth, a chemist in Indianapolis, has learned by experimenting that if he heats this remedy for a continued period of time, about twenty hours, he will make the phenol and sulphuric acid combine so there is less than one per cent of uncombined sulphuric acid. I never got the results before that I get now since I have been using phenolsulphonic acid made in this way with the minimum amount of uncombined sulphuric acid. This is what I call a bone-cell stimulant.

If I have no roughened edge or process or roughened end of the root with which to contend, the chances are that if I force phenolsulphonic acid through this canal and sinus, I will so stimulate the cells in the area as to change that chronic to an acute condition and the chances are my case will heal without root amputation. In a case like this if I simply forced it through and let it come out of the little opening I made with the bistoury it might not heal. You almost always have to evacuate the pus with the lancet or bistoury in such cases. The pus will work its way through the bone and get between the periosteum and bone and spread out. It will separate the periosteum from the bone for a considerable area and if it stands there long the chances are the bone will die and you will have to go in and curette the part. I would use the phenolsulphonic acid no stronger than 50 per cent; if heated for twenty hours I would use it 85 per cent. Sometimes it is advisable to take the precaution in forcing that through to take a little piece of blotting paper saturated in oil and place that over the lingual opening. Hold that over the opening you have made so that when you make the pressure

on the cotton with unvulcanized rubber, as the remedy will come in contact with all the area involved by spreading out and stimulating the other cells in this area as well as going right through and simply stimulating the cells all along the tract.

The last thing I use in these complicated abscesses is phenol-sulphonic acid; if that does not heal the condition in one or two treatments, then I would want to send the patient to Dr. Schamberg and have him amputate the root. But he cannot do that for all of us. More of us ought to be doing that to-day than are doing it. I will turn it around and say we ought to be extracting less teeth that have complicated abscesses on them than we are doing to-day. If the crown of the tooth is anywhere near perfect, and specially if the tooth is good on either side, I want to amputate the root. If I had a badly broken down root and probably would have to put a crown on that anyway, as well as crown the tooth on one or both sides of the space, then I would rather perhaps extract that tooth than amputate, even though I could make a success of root amputation. It is not a question of what we can do by delicate technic, by ingenious skill; it is a question of what is best for the patient's interest. The patient's interest ought always to be our concern.

I have got to fill these roots and then I am through. I have tried, and I have tried hard, to sterilize this root; I mean by sterilize, I have tried to establish and maintain asepsis. If the tooth was discolored I tried to restore the color of the tooth. In this same case I had in mind these three essential factors; to establish and maintain asepsis; preserve or restore the color of the tooth, and now I am ready to fill that tooth. I have tried to do that in that case and I have tried to do the same thing here.

I have purposely avoided in my lectures throughout the country, and especially in my writings, except in the book, telling how I fill root canals; because I think it is the hardest thing to tell a dentist. I don't care how you fill a root if you get a result. It is results that ought to gauge our ideals in the practice of dentistry. So if you can by some means familiar to you thoroughly fill a root so that the aseptic condition you have established will be maintained for years to come, then I don't see why you shouldn't use that method. But because I have been misunderstood by good men in the profession I want to take this

opportunity to tell you my technic of filling a canal, tell you the remedies I use and my reasons for using them. I can do it briefly.

I don't use any paste composed of zinc oxide, formaldehyde gas or formalin, creosote, or whatever it might be, pumped down in these canals I have sterilized and push gutta-percha through it. I don't use it, because if I force any of that paste which contains formaldehyde through the end of the root, as I am liable to do, the chances are I shall have to extract that tooth, which I would not need to have extracted had I been careful in filling the root. If I used paste in that canal which contains formaldehyde gas, even though I don't force the paste through the root, but force the gutta-percha point through the paste and put that point through the root, as I am likely to do, especially in filling a tooth of this kind where I get no response on the part of the patient, not one from which I have removed a live pulp or simply a putrescent pulp,—if I have forced a gutta-percha point through the end of the root and there is formaldehyde in my root canal, that formaldehyde will so toughen the gutta-percha that in time I might just as well have a wooden tooth pick pushed through the end of that root. If you have ever extracted teeth that have been filled with these celebrated abscess cures, mixtures of zinc oxide, beechwood creosote and formaldehyde, flavored with some flavoring agents, if you have ever extracted teeth filled with so-called paste in which gutta-percha point is forced through the root, take that point out if not broken in extracting, and try to bend it over; it will not bend; you know that gutta-percha point will bend. It has been so toughened it will break like wood. I don't want formaldehyde pushed through the roots in my mouth, nor gutta-percha, specially if that gutta-percha point is anywhere near formaldehyde where the formaldehyde can subsequently act upon the gutta-percha. There are more gutta-percha points sticking through the end of roots than you have any idea of. There are just about as many large canals over-filled as there are small canals under filled in the mouths of patients today. But Nature oftentimes takes kindly to gutta-percha if you don't destroy its texture.

I don't advocate, you understand, forcing this cone through the end of the root; I want to force it just to the end. But that

is easier said than done, especially if I have no tissue in the apical area to guide me when I get to the end. I don't want to wait in filling the root upon which I have treated an abscess, with or without a sinus, until all the tissue heals. I want to fill it just as soon as I get the pus formation checked and just as soon as the sinus, if I had one, is beginning to heal and therefore avoid the weeping condition we often have if we wait too long to fill the root. I want to fill the root just to the end but no farther. That is a difficult thing to do.

With the root sterile and dry I take modified eucapercha, called also eucapercha compound. The thing I want to do is to take and have the dried canal moistened with eucalyptol. I don't want to use oil of eucalyptus; if I do my tooth will get sore in every instance. Even if I have eucalyptol, the most volatile constituent of oil of eucalyptus, and use too much of that, my tooth will respond, because that tissue in the apical area is a delicate, responsive tissue and it becomes irritated oftentimes on the least provocation; we have got to handle it delicately. Sometimes teeth will get sore in spite of all our delicate technic, but there is much more pericementitis produced in the mouths of patients today than there ought to be because of either the carelessness or ignorance on the part of dentists. We are not careful enough in our technic and in the selection of drugs to have them non-irritant. So if I use too much eucalyptol my tooth is liable to become responsive.

I can modify the irritating action of eucalyptol and add to its disinfecting power if I add menthol and thymol to it. Thymol is a god disinfectant. It is an agent that will not only cripple a germ and lessen its activity, hold it in abeyance for the time being, but it will kill the germ when it can get at it. It can get at it in a test tube and in a canal. If the germ were hidden among the cells of living animal tissue it might not be able to get at it, but if the germ is in the lumen of the tubules of the dentine the thymol will kill it.

I will try to get the best eucalyptol and then I will add menthol to that to overcome its irritating properties, and I will add thymol to it to increase its antiseptic power and also to have the action of thymol in my canal. Dr. Miller said a root canal filling ought to have five essentials: mildly antiseptic, easily inserted



and easily removed, if necessary, should not color the tooth, should not irritate the membrane and should be nonabsorbent,—mildly antiseptic, should not discolor the tooth, nonabsorbent, nonirritating, easily applied, and if you want to get it out, easily gotten out.

I use eucalyptol because it will dissolve gutta-percha. If I moisten the canal with eucalyptol and put gutta-percha down in there it will make the gutta-percha have a tendency to hug the side of the root. If I pack gutta-percha down there firmly enough it will not shrink, it will not contract, it will fill the canal as thoroughly as I believe the canal can be filled. But if I use too much menthol and thymol it will destroy the solvent power that eucalyptol has for gutta-percha.

I don't have much confidence in remedies where the pamphlets and testimonials advertising them say the inventors have laid awake nights for five years and finally by a process known only to them and their Creator they have devised a preparation, a remedy, as a result of their sleepless nights, burned-up oil and burned-up energy, with which you can get such brilliant results. I say I don't have much sympathy for talk of that kind. But I did have to experiment a little, probably as much as I have with any of these remedies, to find how much thymol and menthol I could add to eucalyptol to allay its irritating property and add to its disinfectant power, and still not destroy its solvent power for gutta-percha. I found I could add five grains of the two, three of menthol and two of thymol, to a dram of eucalyptol. This remedy is called eucalyptol compound.

Eucapercha compound is made by taking white base plate gutta-percha—I want it white because if it is red and some of it should get into the crown I may stain my tooth. I want to take every precaution possible to preserve the color of the tooth; that is the reason why I take white base plate gutta-percha. And by a process of heating, having a retort whereby we can collect the volatile constituents as they vaporize they can be brought back and be condensed and drop in our retainer. We can make eucapercha compound without loss of the volatile constituents, a very difficult thing to do however. Heat it in a test tube or in your laboratory and one-half of the eucalyptol, nearly all the menthol which is volatile, and some of the thymol at least will

be evaporated. You will change the relation of the constituents of this remedy if you are not careful in your effort to make that remedy dissolve gutta-percha. By a process known to chemists—all you have got to do is to have a proper retort—you can make this eucalyptol compound dissolve gutta-percha and have the resultant mixture a solid. It will be a solid that melts at the temperature of the body. If you take some of that eucapercha compound and put it on the thumb nail and hold it a while it will liquify; the heat of the tooth will liquify it much more readily than the thumb nail; there is more animal heat in the tooth, and still if you hold it on the thumb nail long enough, about a minute, all the eucapercha compound will liquify.

When I was filling roots with chloropercha, before I got through I had it all over the rubber dam, all over the tooth and all over my fingers. Now I can take, having this canal dry and sterile, just the minutest quantity, two or three times the size of a pinhead, of eucapercha compound on the point of a broach and carry it to the mouth of the canal, look out of the window for half a minute, and it is liquified and I can work it up and down in the canal, and when I am through all the eucapercha compound I have used is in the canal, and a little on the broach. I have got that canal lubricated, moistened with eucapercha compound, the outside of which is moistened with or lubricated with the solution of white base plate gutta-percha dissolved in eucalyptol to which menthol and thymol have been added.

Take a gutta-percha cone,—I want this to be sterile; I am going to try and get one cone that will just go to the end of the root rather than four or five little ones where there is a possibility of forcing one through the apex and into the apical area. I first measure the larger canal before I attempt to fill it and then select a cone that will approximately fit the canal and then just force it to, and only to, the end of the root. I would rather the gutta-percha cone would be a little too large than too small; then when I get it down there as far as I can by mechanical pushing I take an instrument, heat it and soften it, then while soft I push it down in the canal. Now I think I have got that canal filled with gutta-percha just as well as any canal can be filled.

However much I may regret it, there are some canals so

small, so fine and tortuous, that I ought to know, if I have got any common sense at all, that I cannot do that which I have told you to do. Sometimes I am surprised after I have worked down in a canal, one which I think is fine and tortuous, to find how large it really is. After I have found it and located it and got into it, if I find it to be in that way, then I will fill it in the manner indicated. If after diligent working and an honest effort,—not just making one or two jabs and if I don't find it think there are only one or two canals where there should be three—if after honest search I find where a canal ought to be and I can just enter its mouth only a small way perhaps with a very fine broach, I ought not to try for I cannot fill such canals with a gutta-percha cone. When I get a canal that fine I don't try to do that.

I don't believe in pastes as a general rule, but in that particular instance rather than leave it open, rather than leave nothing in there, not even the thymol in my root filling, I will put something in there that is better,—precipitated calcium phosphate. That is practically nothing but powdered tooth-structure just as white as snow. You can take zinc oxide but it is not as good. You can get the other if you try at the drug store; get it pure. Incorporate half a dram to the ounce of thymol.

In treating these small canals I place over the mouth of the canal a paste made of thymolized precipitated calcium phosphate, as a powder, and formocresol, as a liquid. Over the mouths of these small canals I put this paste and work it down into the canal as best I can, being sure there is none of the paste on the walls of the cavity, cover with cement, and I will never need to worry about that tooth developing an abscess.

I have worried you long enough. I hope I have made clear to you how I try, at least, in my treatment of these conditions to accomplish these three things, namely, to establish and maintain asepsis, to preserve or restore the color of the teeth and to thoroughly fill the canal.

I assure you that I thank you for paying such excellent attention to me on this warm afternoon, especially where if you could only get out you could view the beautiful scenery you will find at this particular spot.

J. A. VUILLEUMER, D. D. S., NEW YORK CITY.

When Dr. Allen asked me to discuss Dr. Buckley's paper on Putrescent pulps, I proposed to him that I would make it the subject of a short paper, including an account of some of my own experiments dealing with the chemical changes taking place in a putrescent tooth, the formation of an alveolar abscess, and the reactions occurring when using the formocresol solution as advised by Dr. Buckley. It is principally this latter that I regard from a different view point. The presence of free gases, in the pulp chamber, the changes taking place when those gases are acted upon by MCHO, into non irritating substances, principally the formation of metallic alcohol and free sulphur, are parts in which I beg to differ.

The chemical-pathological changes taking place in the pulp, during the stages of infection and decomposition are as follows:

#### THE INFECTION.

Most inflammatory conditions of the pulp are due to bacterial infection. As soon as the microorganisms have reached the pulp there is a marked vascular dilatation in that area. A great many leucocytes migrate into the pulp tissue proper and by secreting alexines, (complex proteid corpuscles stored within their bodies) or by phagocytosis, they attempt to destroy or inhabit the invading bacteria. On the other side bacteria produce toxins, which are albuminous bodies. Foremost among the invading pyogenic microorganisms are the streptococci. Miller, Baumgartner, Mayrhofer, and Sieberth found them predominating. Besides streptococci we find staphylococci, sarsinae and yeast cells, according to the stages of infection and the conditions present. If the inflammation and infection proceeds, the capillaries and small veins become very much dilated as in all inflammations. The connective tissue cells atrophy,—odontoblasts disappear. There is an extravasation of blood into the surrounding tissue. Stasis is followed by thrombosis and the circulation stops. Immediately there is an entire change of the bacterial flora. We have now an anaerobic medium as the  $O_2$  has been shut off by the arrested circulation. Those microorganisms which are obligatory aerobic die or are encapsulated.



THROMBOSIS, AND THE ROLE WHICH THE  $O_2$  PLAYS IN  
DECOMPOSITION.

The conditions for clotting in the pulp are especially favorable, because the nucleo-phosphoric acid of the polynuclear leucocytes has a tendency to combine with the abundance of lime that exists in a tooth, and thus forms a soluble lime salt, the presence of which is a requisite for rapid clotting. As soon as thrombosis in the blood vessels of the pulp has been accomplished, there is an enormous chemical change taking place in the tooth. The supply of  $O_2$  available for chemical reactions has been cut off. The  $O_2$  present is exhausted in forming solid chemical combinations, and a period of want of  $O_2$  begins.

## THE MICROORGANISM.

This is felt especially by all the living microbes. As I have mentioned above there are two groups of microorganisms,—the aerobic those necessitating the presence of  $O_2$ , and the anaerobic, which can live without  $O_2$ . The division is not absolutely strict, because there are certain microbes, which can thrive in the presence or absence of  $O_2$  and which are called facultative aerobic or anaerobic bacteria. Most microbes can stand the adverse conditions, without succumbing though turning into a condition of utter chemical inactivity. The pus microbes such as the streptococci and staphylococci seem to disappear. Some however are encapsulated in the ramifications of the dentinal tubuli and canaliculi of the cementum, thereby escaping the overcrowding by the anaerobic flora.

Among the anaerobic bacteria we find:

Streptococci (of which some types are semi-anaerobic).  
Bacilli, etc.

Among aerobic streptococci bacteria:

Staphylococcus, pyogenes aureus, citreus and albus.  
Other micrococci, and Bacilli, etc.

## THE CATABOLISM OF ALBUMEN.

The chemical interchanges that take place now are almost unique in the body. The albumen goes through a process of absolute anaerobic decomposition. We cannot go into all the

details of thrombosis and coagulation necrosis. It may be sufficient to mention the following:

For want of O all the cells composing blood vessels, nerves and connective tissue of the pulp become necrosed, of course partly through the influence of the toxins from the pus microbes and of those formed by the anaerobic group. The membranes of the dead cells change their osmotic qualities. There is a general interchange of the many albuminous substances that form these different cell bodies and cell nuclei. This mass of albumen composing the pulp, with all its complicated molecules of nuclein, etc., splitting up, begins to peptonize (through enzymic and bacterial action). The large molecules of proteins, albuminates, albuminose and peptones begin to split up into amino acids, glykocoll, amino-propionic acid, leucin, cystin, indol, skatol and lysin. Dr. Buckley and various other authors have already mentioned some of these facts. Some of these substances are combined with phosphoric combinations or with fatty acids and split up again into smaller molecules. There is a possibility that some of the members of the purin group are formed the relatives of uric acid. The phosphorus atoms are combined with  $O_2$  to phosphoric acid, the  $S_2$  tries for  $H_2$ , the  $Cl_2$  goes to  $H_2$ , and the N. and P. atoms that do not find a chance for O. go to  $H_2$  and form  $NH_3$ , or  $PH_3$ .

#### THE ULTIMATE PRODUCTS.

Of course these acids with their strong affinities combine at once in the nascent state, with their affinities amongst the metals. The phosphoric acids combine with the lime of the dentine to a soluble molecule. The traces of sulphuric acid also attack the line forming an insoluble molecule  $CASO_4$ . The chlorine has a special affinity for Mg. which forms part of the dentine and cementum. Fluor gets freed by  $H_2SO_4$ ; and the  $H_2SO_4$  enters into a reciprocal action with Ca. and Mg. The most important acid is the  $HNO_3$ , which combines with Na. and K. It is very unlikely that we find any gases free because in the nascent state they combine. The hypotheses which Dr. Buckley has brought before us, regarding the reactions taking place between  $NH_3$  and  $H_2S$  and  $HCHO$  are very interesting. However, we know, and the doctor has mentioned that himself in one of his papers, read

before the Dental Society of the State of New York, in 1905, that  $2\text{NH}_3$  and  $\text{H}_2\text{S}$  will combine forming sulphide of ammonia. Now sulphide of ammonia  $(\text{NH}_4)_2\text{S}$  when acted upon by  $\text{HCHO}$  will form an entirely different reaction than when in contact with each constituent molecule separately. Richter in his Organic Chemistry states besides that hydrogen sulphide has a reducing action on the formaldehyde; the sulphur replacing the O atom of the  $\text{HCHO}$ , forming  $\text{HCHS}$ ,—Thioformaldehyde plus  $\text{H}_2\text{O}$ . This  $\text{HCHS}$  is a very unstable molecule which polymerises itself almost immediately into  $\text{C}_3\text{H}_6\text{S}_3$  a substance which has no antiseptic properties. A similar reaction would take place if we had  $(\text{NH}_4)_2\text{S}$ . In this case free  $\text{NH}_3$  would be liberated and it is possible that if a large quantity of  $\text{NH}_3$  is present, it will combine with  $\text{HCHO}$ , forming a substance known as hexamethylenetetramine or urotropine. To ascertain more correctly what the results are if  $\text{HCHO}$  and  $\text{H}_2\text{S}$  are brought together, I have brought with me a solution of liquor formaldehyde and a saturated solution of  $\text{H}_2\text{S}$ . We shall now saturate the formaldehyde solution with  $\text{H}_2\text{S}$ . If free sulphur and methyl alcohol are present the sulphur will be seen suspended in the solution. No such reaction takes place. The solution remains clear.

In my opinion the action of the formocresol mixture on the decomposed pulp is mostly bactericidal. The rapid relief we obtain when opening such a tooth seems to me to be brought about by the following:

*First:* We reduce the pressure under which the fluids in the decomposed pulp are held.

*Secondly:* If gases escape they have been dissolved in the pulp under pressure and are freed when the pressure is relieved (Syphon).

If any gases are present they will escape.

*Thirdly:* By sealing in a 20% sol. of formocresol we check the action of the bacteria almost immediately.

We know that formalin is one of the strongest disinfectants we have, and when in contact with the semi-fluid contents of the pulp chamber it will inhibit the development of the bacteria present, until such time when it has united with the substances of decomposition in the pulp, and has formed different compounds, losing its antiseptic properties.

I think this explains to us why we get all the recurrence of the symptoms of a dead pulp, if we seal into the pulp chamber the formocresol combination, and leave it in a few days. The first 24 hours the tooth seems to regain its normal condition. As the time goes on, however, inflammatory symptoms reappear. This can only be explained by the fact that the germs in the smallest canaliculi are not reached by any disinfectant and remain in there until there is a chance for them to grow again. That the microorganism grow into the dentinal tubuli and canaliculi of the cementum was shown by Miller and various other authors. Of recent date Romer of Strasbourg has given us a series of micro photographs, in which you can see distinctly the streptococci in chainlike form in the dentinal tubuli.

#### THE IMPORTANCE OF THE NITRITES.

The microbes, even the anaerobic, have an intense hunger for O and are capable of tearing away one O atom from the nitrates, i. e. they reduce the nitrates to nitrites. The nitrous acid ( $\text{HNO}_2$ ) has quite a special affinity for the Mg. and Ca. and leaves the Na. and K combinations for the Mg. Thus there must be an Mg. extraction from the cementum, leading to a gradual widening of the canal and the canaliculi wherever the nitrous acid molecules can reach the cementum. Of course it is augmented by the decomposition of chlorine, as mentioned above. The cementum would soften at that particular place. There would be a lot of chemical details that could be added here. It may be sufficient to say that through the bacterial decomposition some albuminous bodies can be transformed so far as to form humine substances, humus acid, whereby the black color of such pulps might be explained. Part of the black coloring, especially in the early stages, is due to the Fe. combinations that are derived from the decomposition of the haemoglobin, haemin and FeS combinations.

#### THE FORMATION OF AN ALVEOLAR ABSCESS.

These chemical processes which tend to soften the dentine and cementum have naturally a tendency to widen the root canal, the dentinal tubuli and canaliculi of the cementum. Where the latter are the shortest, near the apex, there is of course a relative-



ly short time for the process to reach the pericementum. The standstill of the necrosis is at the apex, right at the canal opening. There we have all the stages, from an anaerobic decomposition of albumen in the canal to a partly anaerobic coagulation necrosis, to a semi-necrotic layer, in which probably some aerobic microbes still live, to a hyperaemic demarcation line in which the antitoxins hold in check the few streptococci and other pus microbes that have escaped the action of the anaerobic toxins. As soon as the softening of the cementum begins to irritate the periosteal cells of the pericementum, there is of course a reactive inflammation taking place in that spot. Gradually the osteoplastic cells grow into the softened cementum and form a kind of granulation tissue, with abundant blood supply. Now there is a chance again for  $O_2$  being absorbed. There will be great chemical changes. Instead of reduction we have oxidation, and what is most important, an aerobic flora will spring up instead of an anaerobic! Now it will depend whether the pus microbes have survived or not. If they have, there will be an alveolar abscess formed! If there is no abscess, calcium material may be deposited and again the  $O$  supply is shut off. Again the anaerobic process would start up until a new perforation is formed and bring it to a stop and so on.

The whole process can only be seen in canals in which the pulp chamber is hermetically sealed, so that the saliva is prevented from washing away the products in the pulp chamber and in the roots.

In pulp chambers which are open, the process also goes on. Here, however, the products of decomposition are constantly diluted and washed off, so that there is less likelihood of severe softening of the cementum. *This would explain to us the formation of an alveolar abscess, in such teeth in which the nerve has died gradually without giving the patient severe discomfort.*

To investigate the presence of nitrites I have collected a number of teeth in which the pulp was decomposing and which showed all the symptoms of the formation of an alveolar abscess. To prevent further chemical changes, I placed them in paraffin oil until I had some material on hand. The teeth were then split open and the contents of the canal removed with a

broach. They were placed on a slab, mixed with a little distilled water, and a few drops of diluted  $H_2SO_4$ . To this was added a solution of metaphenyldiaminchlorate. If nitrites were present the reaction would be brown, known as Bismark brown. Twice we obtained a slight reaction.

I have not finished studying on this question, but as the time seemed to be opportune, and as your Society has given me permission, I have brought this introduction to the work before you. The contents of the root canal, in such teeth are so small, that it is difficult to get distinct reactions. The whole mass may be about one micromilligram or less. If there is 1:1000 nitrite in a milligram it means 1:100,000 or 0.000001 or 1-60,000 grain—about the lowest quantity for any chemical reaction.

In conclusion I am much indebted to my friend, Dr. Fritz Schwyzer, for his valuable information on the decomposition of albumen.

Before closing, however, I wish to mention a very interesting case of tetanus infection which occurred at the Harlem Hospital, N. Y. C.

The patient, a girl ten years old, presented herself with slight swelling of neck, of four days' duration. She was able to talk and eat. The next morning she could open her mouth but very little, and by evening the trismus was pronounced. She complained of headache and soreness to teeth. Her buccal secretions constantly dribbled from the mouth. Later in the same day she vomited, clear fluid. She was unable to take solid food. Eight days later she was taken to the operating room and two bicuspid and a canine were extracted. An attempt was made to give her a general anesthetic, but the patient had immediately a seizure of convulsions which was overcome by amyl nitrite. The symptoms being clearly those of tetanus infection, and the patient growing worse hour by hour, a spinal puncture was resorted to and 18.cc of tetanus anti-toxin injected. The patient had severe clonic contractions the day following, and died in another seizure the same evening, a diagnosis having been made from the clinical picture at tetanus infection. There was no other visible wound on the body save a few carious

teeth in the mouth. They were removed and submitted for examination.

The bacteriological report showed streptococci, staphylococci, bacilli, spirilla and diplococci.

By culture the tetanus bacillus was produced.

The patient had the habit of picking her teeth with anything that came to hand,—a straw, a needle or a pin. We know that the tetanus bacillus is found in garden earth, and radishes which are not properly cleaned could offer means for carrying the infection into the system by way of a carious tooth.

DR. M. J. SCHAMBERG.

I feel totally incompetent to discuss this very able paper of Dr. Buckley's. He really in his work antedates my interference in these cases. I merely want to say, however, that Dr. Buckley and others who are endeavoring in a scientific way to deal with putrescent pulp chambers and canals are bound to work more good for the general public than can be estimated by our imagination.

I know of no paper that has interested me so much, because while I have seen it here I was impressed with the fact that many of the severer forms of infections about the mouth could be averted by such treatment as Dr. Buckley has indicated. I don't know but that these combinations might be modified by other men but I doubt much whether their results would be better than the results described by Dr. Buckley.

A cure is good enough, no matter how it is accomplished, and I feel confident that if the treatment advocated by Dr. Buckley were applied in these various cases I would have very many fewer root amputations to perform,—to say nothing of the graver diseases about the face and jaws involving the maxillary sinuses and involving those very extensive necrotic processes that invade the jaws of young children. And in that regard I want to encourage the study of the treatment of the pulp chambers of temporary teeth when the pulps die, because I know of no character of infection that spreads so rapidly as that which occurs through the death of the pulps of temporary teeth, especially in children convalescing from scarlatina, measles and like diseases. Owing to the peculiar anatomical construction of the

jaw these infections oftentimes cause loss of a considerable portion of the body of the jaw.

I know of nothing further that I can add, other than to say that I thoroughly indorse the work that the Doctor is doing and I feel confident that many of these severe cases that we see today are to be the thing of the past before a decade has passed.

DR. N. S. JENKINS.

Every word of Dr. Buckley's address has been illuminating, and I only wish that the time were long enough for me to dwell upon parts which have made a very great impression upon me.

From the first moment that he gave to us his suggestions as to the use of formocresol I began to experiment with it and was speedily converted. I may say that I am almost more catholic than the Pope in respect to its free and generous use. When he speaks of careful manipulation to avoid pressure I know what that means as perhaps few men can know, for I have been practicing for many years in a country where dentistry was, for a considerable time, in a very inchoate condition. It was necessary in endeavoring to somewhat illuminate the practice of my German colleagues to dwell very much on what seemed to them at that time unimportant points, and I recollect how difficult it was to teach a practitioner that it is a necessity to avoid anything like pressure in treating a putrescent pulp.

I have found one of the most admirable methods of evacuating pus from such a cavity to be exceedingly fine tissue paper points, which are far finer and more delicate than those made of ordinary absorbent paper such as I believe are in general use, by means of which one can very readily, with that patience which Dr. Buckley has so properly insisted upon, evacuate the contents of such canals with very great success and absolutely without pressure.

I was also very glad to hear what Dr. Buckley said relative to sealing either the formocresol or any other preparation hermetically in the cavity. It is a matter of the gravest importance, not only for the action of the medicament itself, but for the comfort of the patient. To do that is an art. But, gentlemen, to him who has not the delicate touch it will always remain an unknown art. It needs not only good eyesight, but it needs that



delicate touch which should be cultivated from the very beginning of dental instruction. And even with the greatest care there will always be a certain number of men who never can attain to it.

I would also like to say that my method of avoiding pressure that after the medicament is placed in the canal is to saturate a very fine shred of cotton with Fletcher's cement and carry it, upon a blunt Donaldson broach, along the *side* of the cavity up to the desired position. If this is delicately done the cavity is found, upon withdrawing the broach, to be nearly filled without the slightest pressure having been caused. A little more cement may now be flowed over the mouth of the cavity and in a few minutes it will set and the opening be hermetically sealed.

Also I wish to express gratitude that he again accentuates the necessity of not being in a hurry. The patient has come for the purpose of relief, and we are recreant to our duty if we do not put aside every other interest in life until that patient has got relief. It can be done, oftentimes, only by giving to it considerable time.

I have often found that it is an admirable and speedy method of giving relief to pain,—after the root has been treated and before the rubber dam is removed, to throw a stream of ethyl chloride upon the isolated tooth crown and subdue the pain by cold. That is usually a very rapid and satisfactory method of relieving the patient from the pain occasioned by inflammation.

I also wish to express my astonishment that there are still American dentists so skilful that they can successfully fill pulp canals with gutta-percha cones. It is now more than forty years that I have repented of what was up to then my unhappy conviction as to the preserving quality of gutta-percha in root canals. You must remember that we who have been practicing for so many years abroad have had very frequent occasion to treat patients from America who, owing to certain changes in habits of life, such as eating much harder substances in Europe than they are accustomed to at home, have broken down frail teeth which in America might have remained intact for years. I soon found that in cases where the roots had been filled with gutta-percha it was unsafe to immediately set artificial crowns. I have never seen a root which had been filled, for any considerable

time, with gutta-percha, which did not smell to heaven and which it was safe to permanently seal up without renewed disinfection. My experience is not unique. I believe it is shared by nearly all the European colleagues. For that reason many of the first practitioners in Europe have long ago abandoned filling roots with gutta-percha. They often use instead oxychloride of zinc and where this method is intelligently employed subsequent discoloration or abscess is practically unknown.

Time does not admit of going into the minute technic of root filling, but I may say that under modern conditions it seems practical to fill almost every canal with disinfectant and non-discoloring cement.

One admirable method, particularly indicated in narrow or tortuous roots, or those which have contained putrid pulps, is to use white oxide of zinc powder combined with varying proportions of formocresol. When a root has been thoroughly prepared for filling it is moistened with formocresol and then the paste is introduced by such methods as are found suitable. In time it becomes hard, but not so obdurately hard as oxychloride of zinc. It is finally well to fill the pulp chamber and often a large portion of the crown cavity with oxychloride of zinc.

Last of all I want to thank Dr. Buckley for urging us to trust Nature. We can do no better than to trust Nature. We help, but it is very little, after all, that we can do in many cases except to give Nature a chance.

Added to many other things Dr. Buckley has done a great work in placing the treatment of putrescent pulps upon a more scientific basis. Empirically we have long been able to obtain certain results. He has helped us to understand why these results have been obtained, and we believe that which he has done is "but earnest of the things which he shall do."

*Dr. Buckley.* (In reply to discussion.)

The hour is late and I know you are all just as anxious as I am to leave the room and I am just as anxious as you, so I will detain you but a few moments.

I want to congratulate my friend from New York—whose name I pronounce so awkwardly I will not attempt it—for the most excellent scientific work he is doing. I may not agree

with all the things that he has said; in fact I do not; I am not going to worry you and tell you at this late hour wherein I disagree with him. And he has shown you he does not agree with all that I have said. I think if we are honest, if we are truly scientific, we are willing at any time, I know I am, I know he will be, I know other men who have been trying to do scientific work in our profession will be—there are not enough doing it—we are always anxious and willing to stand corrected when shown that the teachings we have been inculcating are wrong.

I want to reiterate again that while I cannot at the present time accept the explanation some men give of the action of formocresol on a putrescent pulp purely from a bacteriological standpoint, as soon as I am shown it is simply a process of killing the germs, ignoring the other things that exist, I will be willing, as I said before, to take off my hat and admit frankly that I am wrong.

The first reaction on the chart is found in every chemistry that deals with putrefaction. The second one I think you will find no where but in my writing, so it is in the second reaction that the doctor disagrees for reasons which he explained. But I believe yet for reasons that are satisfactory to me, and I shall continue to believe them until he shows me from a chemical standpoint I am wrong, that I do get wood alcohol and sulphur as the result of the action of hydrogen sulphide and formaldehyde gas. I am perfectly convinced I can get that in a test tube in the laboratory and if I can produce it in that way I believe it is liable to be produced if these things are generated in a putrescent root canal.

I cannot accept the bacteriological theory altogether, neither can I accept the gentleman's statement when he said if you open the tooth the gases will all escape. As I intimated in my talk I have used all the strong disinfectants, I have used those agents in a strength wherein I know that in a test tube they will kill the germ, not cripple it but kill it, and yet with one exception, formaldehyde gas, I cannot use those same drugs—and I believe they will kill a germ in a putrescent canal as well as they will kill a germ in a test tube—with the same success as I can the formocresol solution. That to me is clinical evidence; however, we cannot rely too much on this. I say that the gases

which are produced are neutralized. The action of formocresol is of special interest to those of us who are trying to find out the why and wherefore for these particular things. The results you know you get, whether you get them according to the bacteriological view point or in the way I have tried to explain. You know you can take a canal, no matter how putrescent, seal in your remedy and get your result.

I was specially pleased to hear the report of that case of tetanus by the doctor. Medical men today more than ever before are directing their attention to the tonsils and to diseased conditions about the apical area of the teeth, because they have proven without a doubt that such diseases as tetanus, pneumonia and tuberculosis are transmitted through the tonsils and through the decayed cavities in the teeth from where they get into the pulp chamber and ultimately into the blood stream. The entire medical profession today is directing its thought to the mouth; it is directing its thought largely to the tonsils. We may be able to show them that the crypts of the tonsils contain these various germs because they are located near the mouth, and if we put the mouth in a healthy condition and keep it as we are taught to keep it by this healthful wave of oral-prophylaxis which is floating over the country today,—that we may be able to prevent these diseases by the germ entering into the tissue through the tonsils, that the diseased tonsil may become diseased because of a diseased mouth.

Regarding the treatment of abscesses and putrescent pulps in deciduous teeth,—when I have a putrescent pulp the chances are nine out of ten I will have an abscess, because the root is more or less resorbed; you will find nearly always in a putrescent pulp pus exuding from the gum. In those cases I treat it in one of two ways, depending upon the time I want to retain the deciduous tooth. Do anything the first time not to hurt the patient; then open into the pulp chamber, then seal in formocresol; if not the first time do it the second time. At the second time I will treat that in one of two ways. If the formocresol has neutralized the contents of the canal and if I want to retain that tooth for a year or two—if the child was six or seven years of age and it was a molar tooth, as it is likely to be, and we would want the tooth to last until the child was eight or nine, in order



to make room for a bicuspid,—I would treat it as Dr. Richards has said.

I would sterilize the canal, then open into the pulp chamber; mix precipitated calcium phosphate and the formocresol remedy on one end of a slab and a quick-setting cement on the other end, keep the cavity dry without the use of the rubber dam, and pack the paste into the pulp chamber, being careful to see that there is none on the walls of the cavity; then have cement flowed over it quickly, filling the entire cavity. If I think the cement would not last long enough, for a year or two, I would drill out that cavity and put in an amalgam filling. But usually cement alone, if attached enough in the wall of the cavity of the tooth, by its adhesive quality, will keep as long as necessary.

If the child is only three or four years when it is necessary to save the tooth for three or four years more, I treat differently.

If I had a tooth where the roots were longer, where there was not much resorption, because I have more the condition of a putrescent pulp than of an abscess, I would sterilize just the same with formocresol. After it was sterilized I would keep it as dry as I could and work eucapercha compound into the pulp chamber and then take base plate gutta-percha and fill the entire cavity. I wouldn't care if the eucapercha compound squeezed out of a sinus a little, provided there was a sinus before I attempted to treat the tooth. That will preserve that tooth long enough, until the time for it to be removed.

I was pleased with the scholarly remarks of our friend from Germany, Dr. Jenkins. Of course I cannot convert Dr. Crouse of Chicago or Dr. Roland of Alton, Illinois, or Dr. Jenkins of Dresden, these men that have been filling root canals with oxychloride of zinc for forty years and have been getting results. But I don't get the results they have been getting. I know they have been getting results or they wouldn't use it.

If it ever becomes necessary to remove a root filling of oxychloride of zinc your bur will jump around and hit the dentine and you will have no end of trouble trying to drill that out, because it is much harder than the tooth. It does not conform to Dr. Miller's idea of a root filling material: it is easily inserted, but not easily removed. Dr. Jenkin's method of spraying the

tooth with ethyl chloride to stop the pain is an excellent thing. I am going to try it.

I want to thank those of you who have remained for your courtesy in remaining.

## REPORT OF COMMITTEE ON TUBERCULOSIS AND OTHER PREVENTABLE DISEASES.\*

M. C. SMITH, M. D., D. D. S., LYNN, CHAIRMAN.

Gentlemen I am very glad to have had this opportunity of addressing you and I thank you for your attention.

Mr. President and members of the Massachusetts Dental Society:

Your committee on tuberculosis and other preventable diseases beg leave to submit the following report:

During the year just passed the world at large has been waging a vigorous campaign against disease, and with marked success. Nearly every civilized government has been taking up some special line, and studying the life cycle of disease peculiar to the country.

Tuberculosis or what is more commonly called the white plague, has probably received the most attention, especially from the lay press. During the last half century the medical men of Massachusetts have demonstrated very satisfactorily their ability to deal with it successfully, but during the last year or more the care of tuberculosis has slipped over to the care of Christian Scientist, the Osteopath, the Press, the church workers, the manufacturers of apparatus, and the compounders of cure-alls, and those most interested in the financial returns from the care of the sick, with what results remain to be seen. Your committee is somewhat in doubt if they will be able to equal the results of the past half century while under the care of the Medical Men.

Pneumonia has received its share of attention. In this the most radical change from the past has been in the use of vaccines. Some report the most glowing results, other disappointing, but all agree that they do not get the vaccine early enough.

Actinomycosis. Some of our Boston men have been experimenting with vaccines for that disease, and we are in hopes of soon being able to report. One thing they have established, and that is, it is a disease peculiar to our native wild animals that inhabit the most inaccessible parts of the Rocky mountains.

The agricultural colleges of the Western States are doing a great work in destroying the germs of disease before it comes

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\*Read before the Massachusetts Dental Society June 14th, 1910.

in contact with man, such as animal parasites, Fungus Moulds, etc., and in educating the farmer how to destroy insects, moulds, fungus, rusts, etc., before they get into his growing crops, so as to send to market foods that are clean, free from disease, and much more nutritious.

We are beginning to study the disease of fish that are transferable to man, for instance, typhoid in oysters. Congress has recently passed an appropriation of \$50,000.00 for the investigation of disease in fish, especially cancer in trout.

The Government inspection of meat. Some foreign governments demand that meat imported into their country must have the government stamp that it has been inspected. Consequently if it will not stand inspection, it is not sent to those countries. I haven't the slightest idea what is done with meat that does not stand inspection. Some of the daily press have accused persons of selling lumpy meat to the Indians.

Vaccines are probably of more interest to the dentist than any other new treatment, and without doubt will play an important part in oral medicine. While some dentists report excellent results, others are discouraging. Sir Ashmont Wright, of London, when he sees a discouraging case says: Gentlemen, this is not a case of failure of the vaccine, but rather of our faulty technique. The autogenous vaccines have a decided action on the pus-forming, micro-organisms in pyorrhea alveolaris, and I can see no grander field for research work than along these lines.

Next we consider the relation of pneumococci infection in the mouth, and that of the bronchi and lungs. What part do spirochete play in disease of the mouth and with other micro-organisms, are they simply lazy inhabitants content to live out their existence in comfortable surroundings, or is the mouth one of their life cycles for a time while they recuperate their virulence to attack some other organism.

The past century has been the medical man's, let this century belong to the dentist. Gentlemen, look well to your field, the mouth, and see that you do your duty. Your committee is well satisfied that if every dentist did his full duty the longevity of life could easily by your efforts alone, be lengthened at least ten years.

Oral Hygiene, the infant. What a glorious birth! We haven't



gotten over the christening when alas a glorious youngster able to make its way alone, has deserted its legitimate parent and has already adopted a foster parent. There are a few chestnuts still to be picked out of the fire, but the dentist will do that. Your committee are afraid that you have put a most dangerous weapon, Oral Hygiene, into the hands of the manufacturer of brushes, and tooth powders, the compounders of mouth washes. Plenty of infusorial earth, or pulverized pumice, is capable of doing damage. In my private practice no one thing has done more damage to teeth than the vigorous use of the brush, and its allies by over zealous patients.

Cancer has become a fashionable fad for research work, and we hope it will continue until something tangible results.

Our Government is doing a lot of work, especially along the line of parasites notably hook-worm, a case where the black-man's disease has been transferred to the white man. Where there was no immunity, the results are already apparent, and the hook-worm has already yielded to medical treatment. The life cycle of bubonic plague has been pretty well demonstrated. Here is a disease of the rodent transferred to the flea, and from the flea to man. We have known infected areas, San Francisco and Contra Costa. The ideal breeding ground has a warm climate with plenty of rats in the cities, and the country full of hutches filled with ground squirrels. At first the squirrels died off by thousands, but the time came when a race of squirrels, simply the survival of the fittest, became immune, or partly immune, to the disease something like a case of walking typhoid, a decided menace to the community. The Government has decided to wage a most strenuous warfare upon the city rat, and the country squirrel, and have taken a zone five miles wide all around San Francisco, and Contra Costa. They do not expect to exterminate the animals, but hope to so thin them down that the hutches will be so far apart that the different colonies will not mingle together.

The anopheles has been elevated to the dignity of recognition by our Government, which has declared an unconditional warfare of extermination.

Our Government has demonstrated its ability to cope with tropical diseases in Panama or the Canal Zone.

Italy is doing a big work in the investigation of Palagra, in studying up its pedigree, the little rascal is somewhat ashamed of his ancestor and it is somewhat uncertain whether he comes from diseased corn or has another ancestor.

Italy is doing a grand work in handling Asiatic Cholera, and we hope that she will be able to confine it to the narrow limit of the present infected area.

Germany is sending her best men to tropical Africa, to protect her African colonies from extermination from tropical diseases, especially sleeping sickness.

The British Empire is fighting disease all over the world. The most noticeable work is in Central Africa, where they have taken their laboratories, where the diseases first made their appearance, thereby studying the black man's diseases, where the black man from hundreds of years' contact with that disease, has become partly immune and can stand the disease better than the white man who has no immunity. The most notable are the sleeping sickness, parasites of man and beast, diseases caused by insects, and diseases transferred from insects to man. Asiatic cholera, and bubonic plague are being studied in India. No grander example of the triumph of man over disease can be shown than that what has been accomplished by the Liverpool school of tropical medicine. When a layman owner went on board his ship as they came in from many ports and found sick seamen incapacitated for work, he conceived the idea of caring for them scientifically, but when he appealed to the medical fraternity he was confronted with the statement that they could get no history of the case, as none of those sailors could understand English. His reply was science knows no language, here is a thermometer, and a microscope, get busy, and if you want more get on board any of my ships, and go to the country from which the disease came, and study it there. As a result the popular branch of medicine in all large cities is tropical medicine.

Respectfully submitted,

MURDOCH C. SMITH,  
Chairman.

**REPORT OF CHAIR AND TABLE CLINIC.\***

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BY HENRY W. GILLETT, D. M. D., NEW YORK,  
AND LESLIE E. PALMER, D. M. D.

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Showing the steps in the technique of gold inlay work by the impression method, special instruments for cavity preparation and polishing wheels from ink erasers to facilitate the finishing.

At the chair different ways of taking impressions of cavities were shown, and some inlays were set, and later a demonstration of the packing of an amalgum die was given.

Some finished inlays made by the same process were shown in the mouth of the patient.

For a more detailed report of Dr. Gillett's remarks, see *THE JOURNAL* for June, 1910, page 109 et seq.

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\*Given before the Massachusetts Dental Society June 15th, 1910.

**THE NEW YORK INSTITUTE OF STOMATOLOGY.**

A regular meeting of the Institute was held Tuesday evening, May 3rd, 1910, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The President, Dr. J. Morgan Howe, occupied the chair.

The Secretary read the minutes of the last meeting, which were approved.

Dr. F. Milton Smith, chairman of a committee, read resolutions on the death of Dr. James G. Palmer, which were adopted as read.

These resolutions appeared in the September, 1910, number of the Journal of the Allied Societies.

Dr. A. H. Merritt called attention to the forthcoming exhibit of the Dental Hygiene Council, to be held from May 12th to May 18th, inclusive, and urged upon the members the importance of attending as many of the meetings as possible.

*The President*—The Institute has already given evidence of its interest in this matter, and no doubt the members will accept the suggestions of Dr. Merritt, who has had much to do with organizing this conference.

We are very much indebted to the essayist this evening for the interest he has taken in our problem of the decay of teeth. Dr. Gies has, from a pure spirit of scientific interest in the study of saliva, taken our problem and made it one of his own, giving us his skill and his time without compensation. We are further indebted to him for coming here now and making an informal report on what he has done for us. I take great pleasure in calling on Prof. Gies, of the Department of Biological Chemistry of Columbia University.

(For Prof. Gies' paper and the discussion see page 262.)



## HARVARD ODONTOLOGICAL SOCIETY.

## MEMORIAL TO DR. GEORGE FRANKLIN GRANT.

George Franklin Grant, D. M. D., was born in Oswego, N. Y., September 15th, 1846 of humble parentage who in their early youth were slaves, his education was obtained in the public schools of his native city. At fifteen years of age he began the study of dentistry under the preceptorship of Dr. Albert Smith of Oswego, N. Y. He removed to Boston in 1867, being at that time 21 years of age. In the following year he entered the Harvard Dental School, graduating with distinction in the class of 1870. Four years later he was appointed Demonstrator of Mechanical Dentistry in the Harvard Dental School, filling that position for ten years. From 1884 to 1889, he was appointed Instructor in the treatment of cleft palate and cognate diseases, and while occupying these positions he invented numerous devices for the correction and treatment of cleft palate. As demonstrator and instructor he served with skill and efficiency and was a most genial friend and helper to every student.

In the practice of his profession he was eminently successful, numbering among his friends and patients many distinguished persons to whom his race and color was no barrier to friendship, but on the contrary an unusual testimonial to his many excellencies of character, as well as to his eminent professional attainments. In the treatment of cleft palate Dr. Grant was a pioneer and an acknowledged authority, his exceptional technical abilities and faculty of imparting his knowledge to others attracted to him a host of admiring and appreciative students and practitioners. As a man and as a dentist, Dr. Grant's ideals were high, he was a true friend, and keenly appreciative of real, true friendship. He had a fine sensitive and generous nature, truthful, upright, optimistic, resourceful, all these qualities, he possessed in a commendable degree. Dr. Grant was blessed with a good measure of material success, by virtue of which he was able to assist many an impecunious young man and woman, in their struggles for an existence; to whom in reply to their oft repeated thanks he applied his favorite and simple admonition, "Now say nothing about it, do your work as well as you can and be kind," that will be the best reward you can offer me.

Dr. Grant was twice married, his family therefore brought him more than the ordinary measure of joy and sorrow. As a man, he was gentle, patient, fugal and temperate, a most devoted husband and kind father.

Until within six months of his demise, he was apparently in the enjoyment of excellent health, and was daily at his post of duty. In March he suffered an attack of La Grippe which later developed serious complications hastening the immediate cause of his death, cancer of the Liver. With cheerful resignation so characteristic of his optimistic temperament, he uncomplainingly accepted the inevitable and with thankfulness for the many attentions and kindnesses bestowed upon him in his last days and hours, he passed out of a life of usefulness and devotion to duty, surrounded by his family and friends at his summer home at Chester, N. H., August 21, 1910.

His funeral was solemnized from his late residence 108 Charles, Boston.

Rev. Dr. James DeNormandie of Roxbury, officiating and paying a fitting and lasting tribute to his useful life and noble character. His remains lie at rest in Mount Pleasant Cemetery, Arlington, Mass.

Dr. Grant was a credit to his race, to his Alma Mater and to his profession. In his death this Society and our profession has lost an able, ethical and distinguished member, whose life and example has been a potent influence for good in our profession.

Be it resolved that this memorial be entered upon the records of this Society and a copy forwarded to his bereaved family.

JULIUS G. W. WERNER,  
WM. P. COOKE,

Committee.

CHARLES G. PIKE, Secretary,







